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2346.—VOL. L. LONDON, SATURDAY, AUGUST 7, 1880. PRICE (WITH THE JOURNAL) SIXPENCE. PER ANNUM, BY POST, £1 4s.

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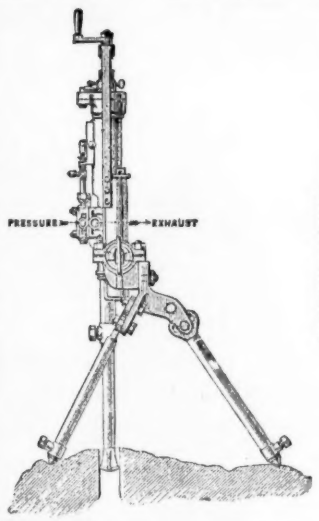

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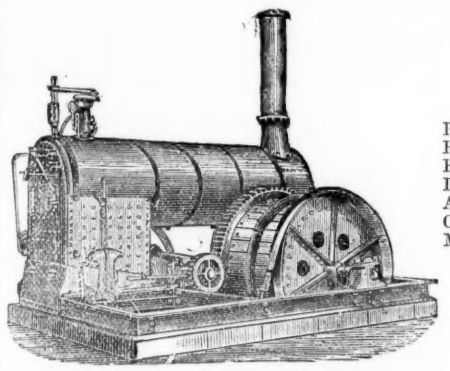

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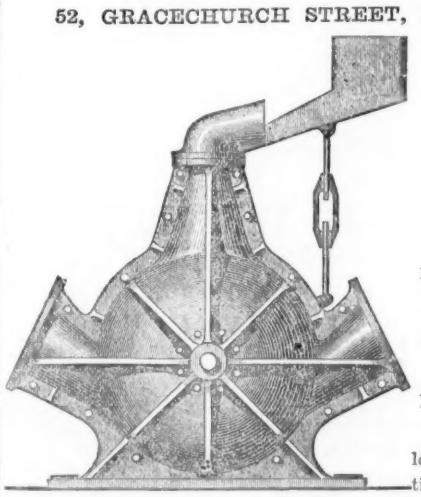

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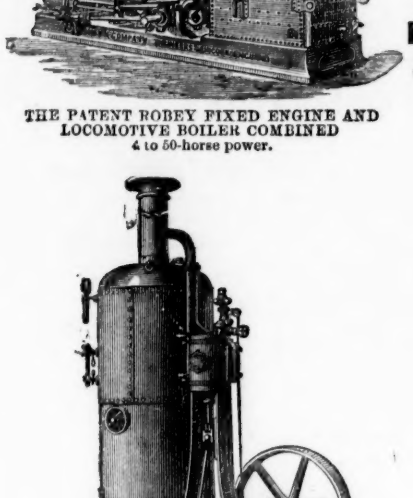

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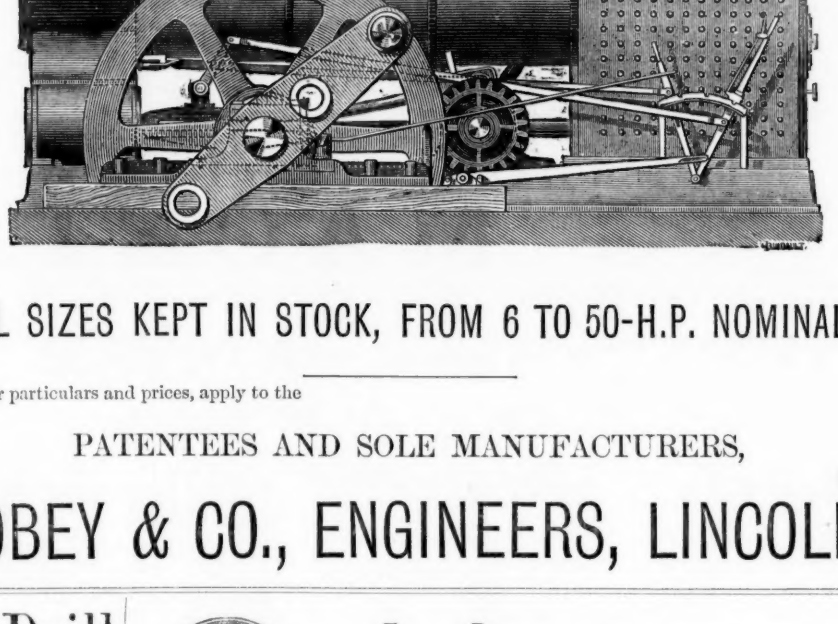

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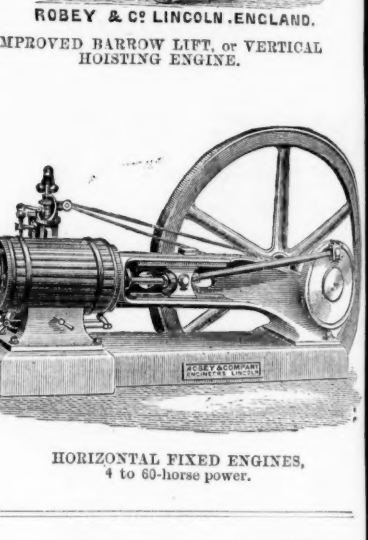

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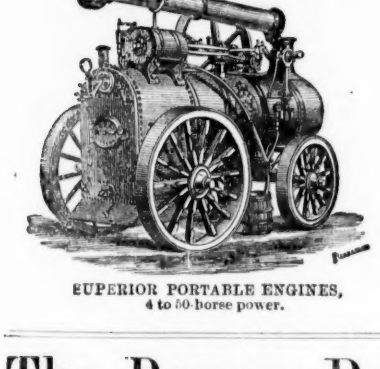

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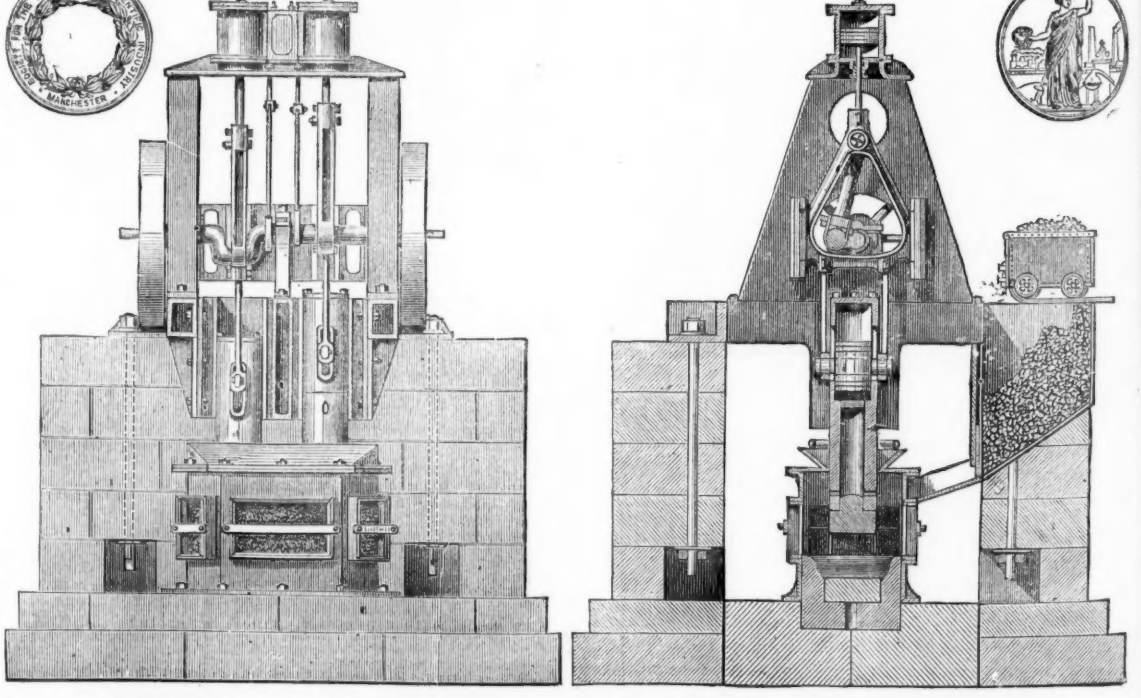

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Original Correspondence.

EXPLOSIONS, AND VENTILATION.

Sir,—Allow me to make a suggestion for preventing the ventilating apparatus of any colliery being deranged by an explosion of gas, as at the Risca Colliery. Let a portion (say about 12 ft. in length) of the arch which covers the air channel between the up-cast shaft and fan be replaced by an iron grating of the requisite strength, and fastened to the side walls with holding-down bolts. Then, let this grating be covered with tarred brattice cloth to render it air-tight. It is obvious that the force of an explosion would exhaust itself through this vulnerable part of the air channel, by blowing the brattice cloth away without damaging the machinery or endangering the life of any man who may be on the pit top. The brattice cloth could be replaced and the ventilation restored in a very short time.

Clydach-road, Tonypandy, July 28. Howell Davies.

MINERS' SAFETY-LAMPS.

Sir,—Your inventive correspondent, Colonel Shakespear, is very eloquent with regard to the merits of his lamp, and it is only to be regretted that those merits are not as apparent to other people as to himself. As to his conical glass there is really no novelty in it; he has merely cut the old Wilkin glass—that used 20 years ago in the lamp made by Messrs. Wilkin, of Long Acre—in half, and used the wrong end of it, or, perhaps, I should say uses an end when he ought to use the centre to pass the light through, so as to have a good lens all round. Of course a military man, or colonel of marines, is as much out of place in a colliery as I should be in command of a ship, and that accounts for Col. Shakespear giving us such an old and clumsy lamp and talking so much about it. His only new idea appears to be that of closing his lamp with a cork, which suggests the idea of substituting waiters for lamp men in the lamp cabin. A lamp which requires a corkscrew to open it is not desirable, as the gallant Colonel will admit if he gives the matter a moment's thought. I believe, too, that both the Wilkin and the Shakespear glasses, and indeed all on the same principle, absolutely obstruct the light, so that if Colonel Shakespear gets rid of the ponderous glass and the solid top he will vastly improve his lamp.

Now, the best arrangement I have seen is the lamp of Messrs. Bennett and Solomon, of Sheffield, whose arrangement consists—1, in the employment of a metallic dome with an orifice in the top placed immediately over the wick-tube or burner, and with holes in the sides covered with gauze; 2, in the use of an internal and external cylinder of glass; 3, in the employment of a metallic band or cap fitting on to the two glass cylinders through which the air is admitted; 4, in feeding the lamp with air from above the two glasses and passing the air between them and through the sides of the dome, so that it enters the dome on a level with or below the top of the wick-tube or burner; 5, in the employment of a chimney (of metal or otherwise) with a cap with an orifice near the top for the escape of the air or products of combustion, the chimney being placed on the top of the internal glass cylinder, so that in the event of the breakage of the internal glass cylinder the chimney will descend on to the dome and extinguish the light.

The simplicity of the Bennett and Solomon lamp can scarcely be surpassed. The base of the lamp is the reservoir for oil, and is fitted with an ordinary wick-tube and wick, and to the upper part thereof is screwed or otherwise secured a brass collar, the oil reservoir having an external thread and the collar an internal thread. The dome is screwed into the upper part of the collar, it has recesses on its upper face into which the internal and external glass cylinders are fixed or fitted; on the top of the glass cylinders is a band or cap of metal having recesses in its under face into which the upper ends of the glass cylinders are fixed or fitted; from this band or cap to the collar above the oil reservoir are rods or stays to carry the upper part of the lamp. The chimney rests on the inner glass cylinder and passes through an orifice in the band or cap, and surrounding the chimney is a gauze shield or cover. The lamp is surmounted with a dome-shaped top which is carried on rods or stays by the band or cap aforesaid. The flame passes through the orifice in the top of the dome and shows a brilliant light, in fact, I should think ten times as much as Col. Shakespear's, and no corkscrew is required. Collier.

Wakefield, Aug. 2.

THE LONDON COAL SUPPLY.

THE GREAT NORTHERN AND MIDLAND, SINCE THE LEEN VALLEY RAILWAY CONTEST.

Sir,—Mr. Allport, at a remote period, fully carried out the principle I enunciate—the course steadily adhered to by the North-Eastern—of shipping the output of the Yorkshire, Derbyshire, Notts, and Leicestershire coal fields *via* Boston Deeps to London in lieu of entire rail transit to the Metropolis, and at a great saving upon rail conveyance with attendant charges. When at my instigation the late Mr. Hudson's *alter ego* at Gateshead, after introducing me to Mr. Hudson at the Queen's Head, Newcastle, who acquiesced in my plan, sent the manufacture of the largest works on the Wear by rail to Hull for shipment per steamer to London. The analogy is perfect, and the *modus operandi* no novelty to the diversified experience of the Midland director, at one period the most important constructor and owner of screw colliers in Great Britain. His partner, the present member for North Durham, stated in a paper on iron shipbuilding he read at the 1863 meeting of the British Association in Newcastle-on-Tyne—"About the year 1850 the carriage of coal by railway began seriously to affect the sale of North Country coal in the London market. It became essential to devise some means of cheap conveyance, to effect which the screw collier John Bowes, carrying 650 tons of coal, was built, which has revolutionised the coal carrying trade." The inauguration of direct rail communication from Northumberland and Durham did not, with then existing much higher sea freights before the introduction of the screw collier by Mr. Allport, cause the railway system under Mr. Hudson's autocratic sway to attempt to cope with sea transit. It is not to be ignored that a large tonnage of coal finds its way by rail transit from Durham, chiefly to the King's Cross Gasworks connected by rail with the Great Northern system.

I am thoroughly posted up in all that regards the supply of Durham coal to the Horseferry-road board, who have no cause to be reticent as to the rate of rail transport for the Usworth coal handed over to the Great Northern by the North-Eastern. No Parliamentary Committee will withold from the Midland the faculty of direct access to Boston after the inroad of the Great Northern into the Midland district. Mr. Howard Allport, son of the Midland director, gave evidence before a Parliamentary Committee. Nottingham is 96 miles to Sutton Bridge, whereas the distance is only 50 miles to Boston. The Great Northern printed coal rate to Boston for export is from Eastwood 3s. 8d. per ton, and to double the distance, to Sutton Bridge, minus four miles, 3s. 2d., and still more monstrous Lynn for town consumption 4s. 10d., no rate for export in printed list, and 3s. 3d. town consumption in Boston, a very much shorter distance than to Lynn. I ask if Boston now fully awakened to the realisation of the commanding position Nature has placed within her reach will return to her somnolency. "Knowledge is power," and most assuredly it will be exercised. The noble chairman, who so admirably and assiduously presides over a vast property, possessing a grand future, and the combined directorate of the Great Northern Railway Company, I approach with the homage of my unfeigned respect in submitting to them the reversal of their Wash policy.

By throwing their ægis over my Boston scheme they will ensure an immeasurably augmented net receipt on the entirety of their London coal income, and by the transit of the coal to Boston over what their general manager has declared to be the most economical system in the country for coal traffic, ensure for their trunk or main line accelerated traffic the most perfect security, which is of the very greatest importance. By means of the large class of steamers employed during the London so-called dead importing coal season in transporting wood from the Baltic at a moiety of the freight at present and for many years existing to Sutton Bridge, Wisbeach, Lynn, Hull, and Grimsby, and the points of consumption they serve, an enormous wood traffic will accrue to the Great Northern from Boston, all which statements I am prepared to verify by the most non-abstruse calculations and highest class practical data.

Little Tower-street, Aug. 4. —— W. J. Thompson.

THE CHANNEL TUNNEL.

Sir,—The experience gained at the St. Gothard Tunnel is certainly not such as to encourage the public to risk their capital in the Channel scheme. The driving of the St. Gothard, as an engineering achievement, was a great success, and the ability displayed by the late Mr. Louis Favre and his officers is unparalleled; yet, notwithstanding the apparently high price at which the contract with him was closed, the loss incurred by Mr. Favre and the capitalists who supported him was 27,000*l.* per mile, or 240,000*l.* in all, up to the end of last year, and will probably reach 30,000*l.* per mile before the work is handed over to the railway company for which the tunnel was made. Mr. Favre's fortune has all been swallowed up, and many of his commanditaires (shareholding capitalists) are well nigh ruined. Even the railway company itself has constantly been in financial difficulty, and unable to make their payments to Mr. Favre as they became due. The railway company would long since have collapsed and been forgotten but for the support it received from the Swiss, Italian, and German Governments, and yet it is now attempting to pacify its dissatisfied shareholders by carrying on costly litigation for the purpose of getting damages for shortcomings which their own unpunctual payments have caused.

This is the result of a successful tunneling scheme, and that being so, what is to be expected from the Channel Tunnel, even the prospective utility of which is not one-tenth that of the St. Gothard? However, putting the loss at only 30,000*l.* per mile, those finding the cash would lose 750,000*l.*, or the railway companies would have to provide that amount in addition to the estimated 10,000,000*l.*, which may be regarded as a perpetual reduction of the railway shareholders' dividends to the extent of about 2 per cent. But the time required is not less important than the money. It has been boasted that the softness of the chalk will facilitate progress as compared with the Alpine schist, though every railway engineer knows that, especially with the present rock-drilling appliances, there is practically very little difference in speed of progress whether the tunnel be made in chalk or granite, the principal portion of the time being consumed getting away the debris, and not in breaking down the rock; the sole difficulty in all long tunnels, where intermediate shafts are impracticable, being that it is impossible to have more than two advance headings going at the same time, so that taking the total length of the Channel at 23 miles, the simple question is how long will it take one pare of men to drive a heading 11½ miles, or 10,120 fms. long?

Now, a rock drill in chalk does practically nothing more than hand labour; it may beat away at 1000 strokes per minute, but it is only like hammering with a 7 lb. sledge on a 1 ft. cube of sound india-rubber; it breaks the workman's heart without earning him salt. It was the knowledge of this that led some of the Channel Tunnel schemers to suggest putting down an intermediate shaft from the Varne bank, and it is difficult to see what would be the objection if the line of the tunnel were reached by a cross-cut, so as not to jeopardise the main driving if the shaft should prove a wet one. But the great question appears to be whether there is any instance of a geological formation having proved absolutely continuous and free from fault for 23 miles? This has already been asked in the Journal, but never answered.—*Aug.* 2. —— Speculator

COMPRESSED AIR.

Sir,—In summarising the observations on this subject, the writer wishes to point out the various purposes to which compressed air may be applied. Aboveground it is proposed to be used as the motive power for locomotives on tramways and underground railways, and there is no doubt there is a wide field for its application in this direction, seeing that the useful effect obtained in this case must greatly exceed the per centage that is generally mentioned as being obtained with machinery placed underground, where pipes of considerable length are often required to conduct the air to the various working engines placed in the mine; the resistance arising from this source will, therefore, be avoided. Compressed air as a motive power has been applied to various underground purposes; for hauling engines it has been largely used, particularly in South Wales. At one of the collieries belonging to Powell's Duffryn Steam Coal Company a system of hauling by means of compressed air machinery has been initiated, which will do away entirely with the use of horses. A short time ago hauling engines, amounting to 26, were in operation, the largest of these being used for main roads, the medium size for branch roads, while the smallest size, with one cylinder of 8 in. diameter, is intended to supersede the labour of ponies and putters by conveying all the coal from the working faces to the branch roads. As this will involve the use of a complicated arrangement of wire ropes, it is doubtful whether the system could be carried out generally in every mine or district in its entirety, though under some favourable circumstances it may be applied successfully. In the Earl of Durham's Newbottle Colliery a similar innovation is contemplated by means of locomotives of a smaller size than those now used on the main roads; these are designed to supersede entirely horses and ponies employed in the mine.

In other underground operations compressed air has played an important part; it is used in driving machinery for pumping water, machines for cutting coal, and for rock-drills. The latter were brought into practical work, if not into existence, from the need there was felt of a more rapid method of driving tunnels, more particularly the Mont Cenis Tunnel. The success of this undertaking was greatly due to the invention of Sommeiller's drills; these have been greatly improved upon since his day, so that now the rate of progress made by drills driven by compressed air is four or five times greater than that effected by hand labour. The coal mines of Belgium are greatly indebted for their development to the inventors of rock-drills. In driving cross-measures drifts in these mines rock-drills driven by compressed air are extensively used.

The pumping of water from underground dip workings may be performed by steam, compressed air, or water power. As a rule, steam power is out of the question for this purpose, owing to the fact that the steam-engine cannot, without great inconvenience (from the discharge of heat and steam) be placed in any other position than the bottom of the upcast pit; and, therefore, if water is pumped it must be through the medium of wire ropes, either by deflecting the rope over pulleys or working the pump by means of a crank fixed on the shaft of the return wheel.

Hydraulic power is most economical where there is a sufficient head of water. In deep shafts power is often got from the mains in the pit of sufficient head to actuate underground pumps with a supply of water of only one-seventh or one-eighth the quantity they are capable of discharging to a certain height; in most cases this discharge will be to the bottom of the pit. Pumping water from dip workings by compressed air power is most convenient, especially where pipes have already been laid down for the purpose of actuating hauling engines or coal-cutters. The pipes can be tapped at any point where it is found requisite to fix a pump, even for a temporary purpose.

The only method adopted in the present day for driving coal-cutting machines is by air compressors and pipes laid into the workings of the mine. Hydraulic power has been tried, but the obvious inconvenience of this power led to its abandonment. At Blackwell Colliery, in Nottinghamshire, there are three seams of coal in process of working. Air compressing machinery has been erected on the surface to drive three hauling engines and three coal-cutters—one hauling engine and one coal-cutter in each seam. The hauling engines are worked during the day, and the coal-cutting machines in the night time; by this method the air compressors are worked continuously, and the power is economised.

Another purpose to which compressed air is likely to be extensively applied is in the breaking down of coal in the place of gunpowder. It is to be regretted that Reuss and Co. and other inventors have not succeeded in getting their ingenious methods of bringing down coal generally introduced into coal mines. The writer is not aware that they have been adopted permanently in any colliery as yet; but the time will come when dangerous explosives, as powder, will be altogether discarded in fiery mines—and, seeing the dreadful calamities that have been occasioned by the persistent use of gunpowder, in the face of so much evidence showing that blown-out shots more particularly have been the primary cause of numerous explosions, is it not time that this evil should be done away with, and some safer methods substituted for it? The compressed air cartridges introduced by Reuss and Co. for breaking down coal were some time ago spoken of as a highly efficient method of effecting this object. Besides being safe the coal was brought down in larger pieces, and in less shattered condition, than when explosive material is used. The cartridges consisted of cast-iron, about ½-in. in thickness; into these compressed air is forced, by means of an air-pump, up to a pressure of 9000 lbs. per square inch or more, if required. This seems an invaluable method for fiery collieries, and now, when the use of explosives in mining is seen to be one of the greatest evils of the day as a primary cause of the ignition of accumulations of fire-damp, resulting too often in the loss of a number of lives and great destruction of property, there are surely sufficient reasons advanced to prove that every effort should be made to introduce the mechanical methods of bringing down coal into general use, and the use of powder prohibited.

—— M. E.

GOVERNMENT INSPECTORSHIP OF MINES—WESTERN DISTRICT.

Sir,—On perusing the last few numbers of the *Mining Journal*—which have accumulated during a brief absence abroad—I chanced on a letter from Mr. R. Symons, of Truro, in the Journal of July 17, explaining his discovery of the official procedure in filling up the vacancy caused by Dr. Foster's removal to the Welsh district. Although Mr. Symons' discovery can hardly rank as equal in importance with those of the philosopher's stone or perpetual motion, it is yet worthy of record. Personally, I was none the wiser for the information conveyed in his communication; but remembering some previous letters written by Mr. Symons on the same subject I can appreciate his surprise on learning that the Home Secretary should have applied to the Director of the Royal School of Mines instead of recognising the varied accomplishments of Mr. Symons' nominee, whose cause he has advocated with such pertinacity in your columns.

As Mr. Symons had the unusual opportunity of placing his nomination before both the present Secretary of State for Home affairs and his predecessor, the result would seem to prove that Mr. Symons' influence is, as it were, equal and opposite with both the great political parties. I may, perhaps, be allowed to mention that Mr. Frecheville, the present Inspector, is, like his predecessor, a distinguished pupil of the Royal School of Mines, who has visited and practised in the principal mining districts of the world, and who is, moreover, for Mr. Symons' consolation, well versed in the "ologies," which your correspondent holds in such apparent respect. Mr. Symons' nominee was also, I believe, a student at the Royal School of Mines, but his name does not appear amongst the official list of *diplomés* published by Government.

The position of a Government Inspector in so important a district as that of Cornwall and Devon is arduous and responsible, demanding the exercise of certain qualifications, exclusive of the "ologies," which are generally considered to be the result of education and association, and which cannot be evolved by any amount of scientific forcing. I sincerely concur in the hope expressed by your correspondent that his nominee may receive an appointment elsewhere than in Cornwall. I enclose my card. Cornubiensis.

Aug. 4.

DEVELOPING CURRENTS FOR ELECTRIC ILLUMINATION.

Sir,—I was much interested in the account published in last week's Journal concerning the progress of electric illumination, as I had always a strong idea that the Jablochkoff candle was right in principle, although still requiring some little improvement to perfect it, and this little Prof. Jamin seems to have added. He seems, that is to say, to be moving forward, and not retrogressing as some others are; but coil of wire around the candles is, I think, a mistake, and he must be careful that it does not lead him to greater ones. I should, perhaps, not have referred to the matter had not my attention been directed to it by the specification of one of Mr. Edison's patents, the object of which, although I do not at all think that he attains it, is to facilitate electric lighting on a large scale. It will be recollected that in his system of electric lighting, which, by the way, is very far behind many of his American rivals, he has already proposed to regulate the pressure or electro-motive force at the central station by varying the strength of the field magnets around the induction bobbins connected to the main conductors, any rise or fall in the electro-motive force due to putting on or off lamps being indicated by an electro-meter. He now finds that an electro-dynamometer, similar to that of Webber, but of high resistance, is an improvement upon the electro-meter owing to its greater reliability. Two of such are used and connected across the main conductors in multiple arc. According to his system a city is to be divided up into districts; in each district there is a central station, which station is provided with sufficient motive power and electric generators to supply half a mile radius. At this station he proposes to employ (say) five engines, each of 250-horse puwer; each engine runs by a belt a separate line of shafting; on this shafting is belted (say) 40 electric generators, so that each engine and its system of generators may be considered complete within itself. Two large rods of copper are in proximity to all the generators, and connecting levers are arranged so that any generator may be placed across and feed into the two main conductors. All the generators when connected to the mains are connected in multiple arc, and the field magnet of every generator is so wound, or the pulleys upon its shaft so made, that by increase or decrease of speed, or by a weakening or strengthening of the field magnet, the electro-motive force of the induction may be adjusted to exactly the same electro-motive force in all the machines. He employs several subsidiary electric generators, belted on the shaft of the first engine, which are all in use, and the currents from these machines are conveyed by leading wires to the field magnet of all the generators, and serve to keep a constant field. A second series of these subsidiary machines is connected to the shaft of the second engine, and connected in duplicate, so as to be used in case of emergency, or in case the first engine stops.

For the purpose of changing one subsidiary generator from one set to another set a switch is provided. The subsidiary generators are also arranged in multiple arc, but the field magnets of main line generators are so connected that there will be a row of, say, ten magnets connected in series, and these sets connected in multiple arc. Switches are provided whereby, say, ten field magnets are disconnected at once, the induction bobbin having previously been disconnected from the mains. For energising the field magnets of the subsidiary generators he uses a dynamo-electric machine, the current from which passes through the field magnets of all the subsidiary generators either in series or in multiple arc. In this circuit he places a large number of resistance coils of large wire and subdivided, so that each has, say, one-fiftieth of an ohm resistance. A wire between each resistance coil leads to a rotary commutator, which by being turned short circuits a greater or less number of resistance coils, thus increasing or decreasing the strength of the current in the field magnets of the subsidiary generators, this in its turn increases or decreases the strength of the current in the induction bobbins between them, and this current in its turn increases or decreases the strength of the field magnets of the main line generators, and causes a rise or fall in the pressure or electro-motive force of the line currents, according as more or less energy is drawn from the stations by putting on or taking off lamps or electric engines. Thus he is enabled to cause a rise or fall in the pressure or electro-motive force by turning of the commutator handle. To indicate the rise and fall of electro-motive force the operator at the commutator has before him the electro-dynamometer, as well as several standard lamps, to indicate the rise and fall. This apparatus he proposes to place in a separate room from the main rooms containing the generators and engines, the connection therewith being made by wires, but the movements of the commutator are transferred by gearing and shafts to large dials, one in the generator room and one in the engine room, so that the station master may know the proper time to start or stop one or more of the engines. It may sometimes happen in practice that from the breaking of

belts, or a wire, or other causes, a generator will cease to supply electricity to the main lines, even when the induction bobbin is intact; this will cause the currents from the other generators to pass through this generator and perhaps burn the wire. To prevent this he interpolates a short wire in the induction bobbin circuit made of bismuth or other fusible metal, which will melt and break the circuit, and save the wires of the generator before too great a heat is reached. Between each generator he places a loose pulley supported by a gudgeon, to which pulley the belt may be shifted in case a generator is to be repaired when the system of generators of which it is one is in use. It is well known that at different parts of the main circuit outside of the generators, electric engines almost similar to the generators may be placed for the purpose of giving out power to shafting. He finds that several electro-magnetic engines giving varying amouuts of power, from 20 horse to 1-20 horse, may be worked in multiple arc. The less the power required the smaller the engine, and the greater the power the finer the wire used, and he also finds that it is preferable to place the greatest length of the wire and resistance upon the field magnet.

Now, what I should desire to know is whether Prof. Jamin had both the 5 and the 14 lamps mentioned in the last paragraph but one on one or several, and also whether the use of seperate distributors augments or diminishes the result. What I mean to say is this. We see that 4½ horse-power will supply 14 lamps of 50 becs each, and if this be from one generator and on on one circuit, I should like to know whether without altering the speed of the engine, a better or worse result is obtained by taking the electricity from several generators or distributors. If a given number of lamps be used, say 15, will the aggregate illuminating power be greater or less when three generators or three distributors are used than when one only is employed?

City, Aug. 2. ——— ENQUIRER.

TIN DEPOSITS IN THE MALAY PENINSULA.

SIR,—When I was in the Malay Peninsula I had occasion to visit the districts in which some of the principal mines are situated, and I send you a few notes in regard to what came under my observation which may be interesting to you. As you are well aware I did not visit the country with the view of inspecting or reporting upon the mines, and hence I do not trouble you with details in regard to the geological formation of the district or the extent of the ground covered by the alluvial deposits to which I refer. Near Malacca was the first place I saw any tin being found. Walking along the seashore I was astonished at seeing at high-water mark a thin layer of very fine tin extending along the shore for some distance; about a mile from the place where I first saw it I observed some Chinese on the sea-shore, about 200 yards from high-water mark, and on enquiring what they were doing was iuformed "raising tin." The mode was as follows: At first a layer or bed of mud and sand was removed, varying from 6 in. to 2 ft. in thickness, and immediately below it the tin was found. I could form no idea of the depth of this bed, as the holes from which the tin was taken filled almost as fast as it was taken out. No tools were used, "the hands only being required" to remove the mud, &c. This work is continued daily at low water. From the little I saw I was convinced that a large deposit of tin was in this immediate neighbourhood.

Qwalla Lumpor, the largest town in the province of Salangor, was the next place where I saw any tin mines. This town is situated about 35 or 40 miles from Klang, up the river, and is the seat of H.B.M.'s Resident, Capt. Douglas. This river is navigable at present for barges the whole of the way to Qwalla Lumpor, and with trifling expense it might be made navigable for small steamboats. The mines here are on an extensive scale, about 7000 Chinese being employed in working them. The land on which the tin is found is very flat, consequently water is the source of a great amount of trouble, in some cases compelling the mines to be abandoned. The Chinese here have no idea of pumping machinery, and are too bigoted or superstitious to be advised. So superstitious are they that it was only when I went barefooted and without my sun umbrella that I was allowed to go near these mines. The Chinese say "Europeans frighten away the tin." The tin in these mines, like all other deposits in the Peninsula as yet discovered, is in an alluvial state. The mode of working is as follows: A large excavation is made in the ground, soil, clay and gravel being removed in baskets, under which and mixed with sand and deposed granite is the bed or deposit of tin, sand and clay being below. The bed or beds above the tin vary from 2 to 15 ft. in thickness, the bed of sand and tin being from 6 in. to 5 ft. in thickness. Tin is found to a greater or less extent over a great part of Salanger, but as it is at present worked large quantities are lost; the whole of the rubbish covering the tin being carried and deposited on new ground, apparently as rich as the portion worked.

In Laroot, in the province of Perak, a larger extent of tin ground exists than in any other part of the Peninsula. The deposits are in much the same form as Salangor, but the bed of tin sand is much thicker, varying from 5 to 8 ft., and yielding from 4 to 6 per cent. of tin. These mines are in the hands of a more intelligent class of Chinese, who are less prejudiced against improvements. The Chinese pump has been introduced with great success; this has been accomplished in a great measure by Mr. Scott, the Inspector of Mines for the Perak Government. The mode of washing the tin sand is very primitive, consisting of a wooden trough about 20 ft. long, 2 ft. deep, and 2 ft. wide, placed at various grades about 10° or 15°. Into this trough, using hoes for stirring up the stuff, a plentiful supply of water is constantly running through. The result of this way of washish is that nearly all the fine tin is lost. The furnace used for smelting the tin is as old as the way of washing. A plentiful supply of timber for all purposes is on the spot.

The deposits of tin throughout the Malay Peninsula are, no doubt, from some vein or veins in the hills, the tin becoming finer the farther the deposits are from the hills, which, in my opinion, proves that during some period of time the whole of these deposits must have been washed from those veins. In Salangor no royalty is paid; a grant from Government is required, costing, I believe, about $6, but a duty is charged on tin exported in slabs of $7·60 per 400 lbs. I cannot say whether these terms apply to the whole of the Peninsula. The great drawbacks to the development of this industry are—want of sufficient capital, machinery for pumping, washing, and smelting, and the antediluvian mode of working. Were these obstacles removed, I am confident that from these deposits of tin large profits would be made which would be materially increased when the tin veins were discovered.—*Singapore, June* 28. CHAS. VERCOE.

CANADIAN MINING

SIR,—As there is just now a feeling springing up that Canada is a desirable field for investment of British capital, it would be interesting to know what progress is being made with the few Anglo-Canadian concerns at present in existence. First, there is Betts Cove, whose ore constantly figures in the Swansea Ticketing list, and which sold over 8000*l.* worth of copper ore during last quarter; then there is the Frontenac, which had some promising lead property about Kingston, and the Canada Gold, which was to have commenced paying dividends long ago, but of which lately very little has been heard, and from which no gold returns, at least to the sharholders, have yet been made. But taking only Betts Cove, I think it will be found that it surpasses every Devon and Cornish mine in existence, Devon Great Consols included, which is only selling about three-fourths as much ore, and that its great prosperity has been obtained with a very small outlay, and at a much less cost for management. But what "Bournonite" must show, if he really wishes to see English capital put into Canadian mines, is that the laws protect the capitalist, and that there is a sufficiency of labour and of either water-power or fuel to make the working there remunerative. He must show capitalists how to obtain the mineral grants at what the Americans call bed-rock prices, as it is but too evident that when a company has to earn profits on promoters' prices they cannot do so.

That a property is attractive to the practical miner proves nothing, because unfortunately it is not with the original prospector that the capitalist has to deal, and it is difficult to know how this direct dealing could be brought about. It was publicly stated I believe before the Lord Mayor by the late Mr. Alexander Heatherington that a London promoter refused to return documents to him because Mr. Heatherington having been tendered a cheque for the amount demanded—some 15,000*l*—declined to accept it, accompanied by the condition that he should be silent as to the price paid him when the prospectus was issued. The bargain was annulled, and in the result the property was never brought out as a company. Had the public obtained it for even 20,000*l.* they would with 30,000*l.* working capital have been able to earn a good 20 per cent. on the whole 50,000*l.* nominal capital. But the promoters projected a company with five times that amount of capital, and proposed to take four-fifths in fully paid shares as purchase money, which reduced the prospective dividends to 4 per cent., and made it the interest of the holders of the fully paid shares to create a market for them rather than by erecting a sound dividend paying property in Canada, confer a lasting benefit on the province, on the general body of shareholders, and on the owners of all mining property in Canada by rendering it saleable.

If Canadian property is to be energetically worked by English capital—and the Canadians are too apathetic to work any mines themselves—the Canadian owners must be liberal, and display mutual confidence in the capitalists ready to assist them. No one desires them to give away their property, but they must make their payment depend absolutely on results. They must grant their mineral lands upon the condition that a certain amount shall be expended upon them for labour in each and every year, the expenditure being determined upon by a resident committee, consisting of two mine managers chosen by the directors, two by the owner, and an umpire selected by these four to give a casting vote in case of divided opinion. There are innumerable Canadian mines where 200*l.* per month expended for a couple of years would give a permanent profit of 50*l.* per month from the end of the first year, which represents over 10 per cent. per annum, and selected mines would assuredly give five times that amount of profit. The owner, instead of purchase money or royalty, should receive one-fifth of profits. This would keep vendors' and owners' shares altogether off the market, and add to the market value of the *bona fide* shares, and if the property turned out according to description the owner would be as well remunerated as by reserving a royalty.

The arrangement protects the owner as well as the capitalist, for the owner never loses control of his property, and if the terms of the grant are not complied with the grantees can be ejected, and it would give capitalists the certainty that all their money will be expended on workmen's wages, material, and plant, and that there is no one to be benefited if the property be not acoording to description. Let one property be tried on these conditions and I feel satisfied that it will work successfully and be widely adopted. CANADIENSIS.

London, Aug. 3.

FLAGSTAFF SILVER MINES.

SIR,—I beg to enclose you copy of a letter which I have sent to Mr. Ellis Pearson, in reference to the mention of my name in the Journal to-day in connection with the examination and report upon the position and prospects of the mines on the Flagstaff lode, formerly owned by the Flagstaff Company, and I shall feel much obliged if you will give publicity to this denial, as there is at present no foundation for the allegation. NICHOLAS M. MAXWELL.

London, July 31.

SIR,—In the article in the *Mining Journal* of to-day's date I see that you allude to my going out to inspect the Flagstaff Mine. I may state that I have made no such arragements; but, in the event of my undertaking such a mission, you may be assured that I shall require to be well satisfied that I am representing parties in treaty with the actual owners of the mines, as I have not the slightest intention of assisting in a "wild goose chase" which may end in further disappointment to already sufficiently ill-used shareholders.

London, July 31. ——— N. M. MAXWELL.

NEW FLAGSTAFF MINING COMPANY.

SIR,—Now that the dispute between the promoters of the New Flagstaff Consolidated Silver Mining Company and Flagstaff (old) Company has been virtually settled by the making of the order for the compulsory winding up of the latter would it not be well for the New Flagstaff to re-issue their prospectus in a modified form, setting forth the reduced purchase money and the easier terms of payment which Mr. Pearson now offers. I know there are many shareholders who have still confidence in the concern, and it is quite likely that had the new concern been launched with a name that would have dissociated it from the Flagstaff altogether—the Utah Virginian Silver Mining Company for example—the whole of the capital would have been subscribed long before this, and the company would have been in full operation.

I can fully understand, however, that reconstitution of the New Flagstaff now would be in the highest degree undesirable, but I cannot see any reason why the vendors could not place the 11,500 fully paid shares—the difference between the 51,500 originally demanded as the purchase price and the 40,000*l.* afterwards declared to be acceptable by Mr. Pearson—at the disposal of the directors to give as bonus to subscribers. By offering one bonus share for every four subscribed for 46,000*l.* would be raised by the issue of 57,500 fully paid shares. Then as 28,500*l.* is required according to the prospectus for working capital there would be 17,500*l.* in cash and 22,500*l.* in fully paid shares=40,000*l.* in all for the vendors.

The public coming in—and these might be old Flagstaff shareholders or others—would receive five shares for 4*l.*, or one 150,000th share of the property for less than 8s. 6½d., whilst the resurrection scheme proposed to give the old share and debenture holders an average of one 150,000th share of the property for 6s. 8d.—the amount of the proverbial lawyer's fees being no doubt chosen in order that the subscribers might be properly reminded that they were purchasing shares in a probable lawsuit as well as in a mine. But unfortunately the old Flagstaff shareholders could not be supplied with resurrection shares at 6s. 8d. each unless they tacitly consented that all their money should go to the vendors except 1500*l.*—an amount which practical men consider insufficient to open several large mines simultaneously—so that the intrinsic worth of their 6s. 8d. share was reduced to about 8d., which would represent their share of the asset of 1500*l.* The amount obtained from the re-sale of the property as an idle concern would of course have been absorbed in management and management and liquidation expenses. This is the true reason why the resurrection scheme received no substantial support from—

Glasgow, Aug. 2. ——— OLD SHAREHOLDERS.

CHEAP MINES.

SIR,—On reading "Investor's" letter in last Saturday's Journal I confess I felt somewhat disposed to be cynical in regard to the motive by which he was actuated in recommending Wheal Buller and others as mines that had done well, but were now neglected. There is something sad and depressing in the tone of his letter, although I can gather that he intended it to have the opposite effect, and he is evidently desirous that these particular pets should be better appreciated by a community at present unacquainted with their superior merits. I will not draw upon myself "Investor's" ill will by suggesting that his object in writing his epistle of last week was purely self-interest, but I should certainly say that a certain amount of that motive power has been at work in its composition. Of course it is a pardonable action, and one which I could not in the least take exception to if it were only placed before me in that particular light. As a supplement to "Investor's" letter, and with the understanding that I am prompted by self-interest in writing, I would draw the attention of your readers to one or two other mines which may be looked upon as cheap—1. West Chiverton: These shares are now to be picked up at a wonderfully low price, considering that at the last meeting no call was made and such excellent prospects were placed before the shareholders by Capt. Southey. At the present time the mine is paying its way from the workings now going on, while good progress is being made towards the intersection of the side lode—a point which should be reached in the course of a couple of months, and should the lode cut good at that point I am assured by Capt. Southey that West Chiverton will take its stand once more as one of the first mines in the county. Looking at the number of shares the concern is divided into, its past success, and its present indications and prospects, I feel confident there is not a cheaper mine in the market and with such a prosperous future before it as West Chiverton.

2.—East Caradon: In the early part of this year when operations were just commencing for cutting the caunter lode, which is expected to raise this mine to its old position in the Dividend List, shares ran up to 6*l.* each. Now, when the excitement has subsided and the point is nearly attained where the lode is calculated to be shares are to be had at 25s. each. These I believe are worth buying at present prices, and I have also acted in accordance with my belief.

3.—Devon Great Consols: This is in the Dividend List, and every month shows some improvement in its output and position. If it continues to progress as it has hitherto done this year month by month the shares will not be bought at 30*l.* each next January. They are now to be bought at 13*l.* 10s. As a dividend mine I consider it one of the best. It is certainly paying the highest percentage on the present price of shares. OBSERVER.

Aug. 4.

THE GEOLOGICAL SOCIETY, LONDON

SIR,—This society, like some others of a cognate description, elect its members by ballot; but it is not like balloting for the election of a member of Parliament, which is determined by a majority of votes. In this case, as I understand, a candidate may be rejected by a single vote, by what is called "black balling." So that if the candidate happen to have only one enemy in the society that enemy can keep him out, however worthy the candidate may be of election. I know a gentleman of eminent ability as a geologist, mineralogist, and civil engineer who was advised to consent to a nomination. His election was proposed and seconded by two highly respectable members, friends of his; but his enemy—some enemy—kept him out. He does not fret about it, for he did not seek election; but such a mode is manifestly absurd. Elections should be by majority of votes, as measures are carried in the Houses of Parliament, where nothing could be carried if unanimity of voting were required. To expect 12 jurymen to be unanimous in all cases is another absurdity; the majority should be accepted as decisive of the verdict; then there would be no locking-up or re-trials for want of agreement. In all cases where the voices of many are given the majority should decide.

Truro, July 31. ——— R. SYMONS.

THE LEAD TRADE.

SIR,—Since writing to you last week the market still continues to be very firm, and the following sales are reported: Greek lead by tender—438 tons (47 oz. silver), 16*l.* 2s. 6d.; 162 tons (37 oz. silver), 16*l.* This is considered a very high price, and the holders of Yorkshire lead and Spanish silver-lead are demanding 17*l.*, but rather more lead offering from Spain. STOCKS.

NANNERCH IRON ORE—NORTH WALES.

SIR,—Will you give me room to ask one of your readers if he will give, through the Journal, a little information about the iron ore at or near Nannerch village, on the Mold and Denbigh Railway. The ore was worked some years ago for the Ruabon Ironworks, but was given up at that time, I believe, on account of bad roads. Is the mine working now? What is the extent of the deposit? What percentage of iron?—*Chester, Aug.* 3. J. HUMPHREYS.

GOLD IN WALES—No XXVII.

VALLEY OF THE MAWDDACH—(SWITZERLAND AT HOME).

SIR,—The idea of "mineral growth at ordinary temperatures under ordinary conditions," alluded to in my last communication, seems to have started a little ripple of excitement amongst some of your readers. Three, at least, of them are slightly uneasy thereon. One says, "I don't believe a word of it;" another, "It is a trifle to smile at;" the other, "The idea is absurd enough to laugh at." Please allow me a little more of your space that I may, in imitation of the considerate Isaac Walton, pass a hook gently into these cowardly "anonyms."

Imprimis.—It is a solid fact that I have had under my own unaided eyes some thousands of recent growths of Merionethshire electrum gold, some of which are ¼-in. in length, and none of them are more than 10 years old. "Seeing is believing," children often say in their mimic experiences, and, with your permission, I will deposit with you an actual specimen of this kind of natural freak—so that my three unbelieving friends may have occular demonstration of the truth of my assertions, and substitute somethingness for their sagacious inference of "nothingness." Moodiness is a human condition engendered often of continued wet weather, biliousness, and gloomy thoughts. My not over-civil critics, therefore, ought rather to thank me faintly for having given them subject matter that can produce a smile, or—what is better still—a laugh. To him who laughs at the "mischievous idea" I would tenderly say that innocent laughter is the most agreeable and economical medicine he can take for his complaint—besides, he helps on the general life-current by his exertion in the direction of cheerfulness. Laughter comforts him who laughs, and almost all also who happen to be within earshot of the laughter. I cannot, therefore, reasonably object to his laughter. I do not object. It always happens that when what is supposed to be a new fact comes to the light that some people say—"It isn't true;" "it's contrary to religion;" "it's opposed to received opinion;" "there's nothing new in it, and everybody knew that long ago," and the like. Verily, common sense now-a-days appears to be a rather uncommon possession. Pity this, for common sense is really the only salt of human intercourse that has not lost its savour. The hastily sceptical probably will condescend to admit that a loving observation and comparison of natural objects beget a love of accuracy, and also that, without question, accuracy is the very foundation of truth. In fact, it is truthfulness, on the way to perfect truth—that standard of moral elevation which holds all people alike inthral, obliges inferiority to fearfulness, commands the heights of human esteem, puts the very devils to shame; in short, is God-like. *Vincet veritas.* If the remarks just made appear to any jaundiced eye to be irrelevant let me explain that they are mainly introduced for the purpose of helping the reader over dry statistical and technical details without the annoyance of yawning under the ordeal.

To return to the subject in hand now I am in the humour. The offending expression "mineral growth" is said to be "inappropriate," because the "growth" of inorganic substances has not hitherto been admitted as a natural history fact. It is also said that the states of being, commonly termed "ordinary temperatures" and "ordinary conditions," are like too many other expressions in scientific phraseology—of no very definite meaning. To a certain extent these are not very unreasonable objections, and yet the last two are likely to be retained in scientific language as long as the "rising" and "setting" of the sun. It is quite true that the so-called "ordinary conditions" of mineral substances are but imperfectly known; at all events, there are comparatively few recorded results of their methodical investigation. This fact is somewhat on a par with a home fact of vital interest—the breathing indoors of *cooked air*. They who breathe it know little or nothing of what they breathe.

So recently as 1868 the highest English medical talent united in effort to enquire into the action of drugs upon the human system, and many antiquated prejudices (the general use of calomel, for example) have had to fall, in deference to this startling *coup d'etat*. Such sublimity of honest earnestness ere long may be successfully imitated by the union of our exalted chemical talent for the acquisition of more accurate knowledge of mineralogical conditions, which at present are humbly named "ordinary." This is written under the impression that just now ordinary conditions may be taken at times to include the unobserved extraordinary. The term ordinary temperatures has certain limits of deviation, which, in a sense, are measurable. The term obviously applies to the variations of the atmospheric air, and to states of heat measure below 100° Fahr. The state of heat of boiling water, 212° Fahr., is never included, nor, in fact, any state of heat produced by artificial agencies and appliances.

When changes of physical structure have occurred in one's cabinet collection of minerals it is not possible to determine in how far they have been the result of spontaneous super-heating by chemical action. One thing, however. is visibly certain—that a kind of energy

has been more or less suddenly produced, and that there has been always a resulting augmentation or aggregation of particles, sometimes apparently of the same non-metalliferous character; at other times of a distinctive metallic kind. These exudations, emanations, or elongations frequently have the appearances of vegetable shapes, and by a sort of persuasive analogy these physical changes of material (as in argentite) are proposed to be spoken and written of familiarly as "growth," or "metallic growth."

The term is designed to include the outcome and progress of native gold, silver, copper, &c., from what are generally considered non-metallic minerals whose ordinary conditions have been hitherto incapable of such production, inasmuch as recorded chemical analyses have hitherto failed, or more correctly speaking, perhaps, have *omitted* to notice the existence of the respective metals in the substances examined.

The protusion or "growth" of branch-like shapes of the metal gold from a transparent quartz crystal, to say the least of it, is mineralogically interesting, and if at present no more than this can be actually said of it, thought very naturally runs in a groove of expectation that chemists will ere long find out what the "little strangers" had to "feed upon" during their infant growth and onward. Can it be that the "Royal Metal" in such a case exists in the quartz in a condition or in conditions yet unknown in chemistry? It would seem so. That gold crystals, or rather crystals of gold, are found pseudomorphous after quartz are pretty well established facts in favour of such a theory.

Admitting the fact that there exist such crystals of gold, it gives a clue to the solution of a portion of the disputed problem of gold growth, by reference to gold in some state within the quartz, before it could possibly come out of it. It does not, of course, explain the mystery of continuity of movement constituting this novel growth or formation force. This, perhaps, never will be fully explained any more than the exact time when animal bone commences, and when and why it ceases to grow, or the homes of the meteors, or why the Great Creator selected the smallest of the planets for the exhibition of creative skill in detail, so wondrously overwhelming to the human mind, however intelligently exalted; or, finally, the infinite *why* of "ordinary" existence. But the determination in a mineral of the presence of that which, whatever it may be, is capable of assuming states productive of ponderable metal, is surely not beyond the reach of possibility, even in the present state of chemical capability of research.

The comparatively new metal zinc has contributed immensely to the improvement of telegraphy, and I think it not altogether an airy supposition that there may be possible relative motive-effects prevalent amongst natural minerals when zinc happens to be present in peculiar conditions. This may be drawing a bow somewhat at a venture. But I know by experience that the presence of zinc in certain mixed sulphides of the Mawddach Valley which contain a preponderance of argentiferous lead ore facilitates very much the extraction of silver therefrom by metallurgical operations.

An idea still prevails to some extent that most metallic minerals, as we find them, have been in that state, or nearly so, for countless ages, and that it is akin to the absurb to suppose augmentation going on *visibly* "regardless of the wondrous conditions of microstructure." Yet it is really so, and this dark erroneous notion will have totally to succumb to enlightenment, and to be decorously consigned in the usual way to the mortuary of exploded errors. "In the Memory of Man," "Pinnock's First Book of Knowledge" (price 9d.), gave it forth authoritatively to the then rising generation:—"The four elements are earth, air, fire, and water." The writer had to repeat those words over and over again, and by repetition, like a good many other notions of the present day, the assertion became a fundamental article of the general knowledge creed. The metal thallium certainly at that time existed, but, as certainly, my friend William Crookes, its talented discoverer, did not. There are said to be about 76 elementary substances now. I need hardly say that some of them are considered to be very doubtful, and that earth, air, fire, and water do not find place amongst them.

To say that "stones grow" may kindle for the moment a small fire of mineralogical vexation, but some of them grow "for a' that" at ordinary temperatures, and under what, to all intents and purposes, appear to be ordinary conditions. Small compliment to ordinary conditions if we continue to treat them familiarly as household words, as if we thoroughly understood them.

Of the formation of matter generally we know very, very little, and as to the manner in which the "flowers of mineralogy" crystals, are multi-formed we are wholly ignorant. In Nature perpetual motion appears everywhere present; perpetual rest nowhere. Surely in puzzling things it is better to say "I don't know" when we are really ignorant, which is oftener than otherwise. "Seeming to know" is a state of being that is awfully "caddish." It ought not to be difficult for lovers of science to admit that "God has given no one the ability to do much, so that there might be something for every one to do." Our ancestors used to talk about "eyes and no eyes, or the art of seeing." Their sons, more or less reluctantly and imperfectly, acquired the "art of reading." Their grandsons, it is feared, have graduated in, or rather degenerated into, the "art of perusing," so that dogma of most kinds, propounded by "those having authority," rightly or wrongly, has got into thousands of thousands of heads by vain repetition, and continue to nestle there somnolently as articles of imperishable belief. Happily, there are many more loving observers of natural objects than there used to be, and many of them of far higher type than most who have preceded them. Natural history studies, however, are necessarily departmental, and, fortunately for all students, the field for observation is exceedingly wide and varied, so that observers who may consider themselves, and may be considered by others, very low down in the scale of observation may in a lifetime possibly find something that has hitherto been passed by unheeded, although it lay in the very research-track of their superiors.

In the aforesaid "First Book of Knowledge" I believe I learned, with becoming fear and trembling, the following natural history dogma—"Plants live and grow; animals live, grow, and move; stones neither live, grow, nor move." Now, this assertion is so prettily put that it seems almost sacrilege to disturb it, yet there seems to be a more natural order for it to run in—minerals grow; plants live and grow; animals live, grow, and move at will. It is, however, with the first assertion that I have confidently to deal. I am unable to shirk the subject if I felt inclined. My unbelieving friends, if they like to take the trouble, will find in the British Museum Library Lord Bacon's "Sylva Sylvarum," edited by Dr. Wm. Rawley (1658), which I have recently been reading. At page 168 he may read as follows:—

"EXPERIMENT SOLITARY TOUCHING THE GROWTH OR MULTIPLYING OF METALS.

"It is reported by some of the ancients that in Cyprus there is a kind of iron that being cut into little pieces and put into the ground, if it be well watered, will increase into greater pieces. This is certain, and known of old, that *lead* will multiply and increase, as has been seen in the old statuas of stone which have been put in cellars, the feet of them having been bound with *leaden bands*, where (after a time) there appeared that the lead did swell, insomuch as it hanged upon the *stone* like *warts*." Further on, at p. 171, is written—"It is certain that all *bodies* whatsoever, though they have no *sense*, yet they have *perception*—for when one *body* is applied to another there is a kind of *election*, to embrace that which is agreeable, and to exclude or expel that which is *ingrate*, and, whether the *body* be *alterant* or *altered*, evermore a *perception* proceedeth *operation*—for else all *bodies* would be alike to one another; and sometimes this *perception* in some kind of bodies is far more subtil than the *sense*—so that the *sense* is but a dull thing in comparison of it. We see a *weather-glass* will find the least difference of the *weather* in *heat* or *cold*, when men find it not."

Somebody is reported to have said in his vexation—"Hang these ancients for stealing my thoughts." I shall not think or say so. I am very glad at having unearthed this agreeable bit of Bacon. Most people like Bacon, and this little slice may help some folks unbelief in "gold growth."

Apropos of Cyprus. This recent acquisition may be a mine of mineral wealth after all, and worth having. Only fancy cultivating crow-bars as easily as raspberry canes. In any case I shall not be "writ down" as the generator of this idea, any more than of that which pourtrayed industrial perseverance in the likeness of a woman sitting on a stone, and rubbing down a crow-bar to the size of a needle she particularly wanted. I can assure you, Mr. Editor, that neither of these notions originated in me, and, as it now appears, neither did "metal growth."—*London, Aug.* 5. T. A. READWIN.

P.S.—A short Act of Parliament, 5 Hen. IV. c. 4 (A.D. 1404) runs thus:—"*It shall be felony to use the craft of multiplication of gold and silver!*" This noose-suggestive, decisive Act was repealed 21 years *after* Dr. Rawley published his book, and your readers, therefore, may infer rightly that they run no risk whatever of being hanged by the neck till they are dead for believing in the multiplication of gold and silver by *spontaneous growth*, or by the acquisition of either of them lawfully in any other way.—T. A. R.

GOLD IN WALES.

SIR,—I find that my modest remarks have been copied into most of the local papers, and have also elicited an elaborate and exhaustive letter from Mr. Readwin, which to a great extent bears out my ideas—that gold in probably paying quantities exists in Merionethshire. We are both agreed on one point, that no fair or even sufficient trial has ever been given to the subject. Enormous sums have been given for properties and large outlays made thereon; but, as far as I know, little or nothing has been expended on exploring the reefs themselves. At the present moment there are most promising setts to be had on the Crown lands for merely the nominal cost of the tack-notes when reefs with gold more or less on them can be seen, and there are also numerous private properties, so that there is no need to pay anything by way of bonus. Were a few gentlemen to subscribe a few hundred pounds to prospect I sincerely believe they would be quite as likely to get a good thing as by going to India. We have the undoubted fact that the Clogau Mine produced 25,000*l.* in bullion in twelve months. I have no interest in the matter, and my experience, such as it is, is gratis at the service of any of your readers who will send you an address to forward to me.—*Aug.* 5. A. U. R.

OUR MINERAL DEPOSITS—HOW TO FIND THEM.

SIR,—In the present day the crowd has, unfortunately, a decided preference for popular instead of beneficial subjects. I have selected and prosecuted one for near 30 years, not by any means popular, but one to benefit my county (Cornwall) if possible. The mineral wealth of Cornwall, the poverty of our mining population, the necessity of a better system to discover our mineral riches, and our study and aim should be to decide on the best means of applying the key to Nature's storehouses of minerals.

Only a very few months since a man would not dare to speak of the mineral riches of Cornwall, when the prevailing opinion was, and had been for years, that Cornwall was done. In 1875 it was stated by a large number that we must find a new industry for our mining population, but to the present the new industry has not been discovered. Happily, after the long ebb the flow has again set in, and the new industry, fortunately, will not be required. And, pray, how frequently during the last 40 years has a similar occurrence taken place, like the going out and coming in of the sea, summer and winter; and my firm conviction is that Cornwall's mineral riches will never fail us, but be as lasting as the two former.

As to the mineral wealth of Cornwall, it is but a few months since that the marketable value of all the mines west of Truro would not reach ¾ million sterling, and now, in 1880, it exceeds 1¼ million sterling, and with a fair amount of observation and perseverance the mining property of West Cornwall will be worth several millions. One of the oldest mines in the county, at the present low price of tin, is selling over 60,000*l.* worth of ore, and paying more than 30,000*l.* in labour cost alone per annum. Our tin lodes, with their rich deposits, are hid from our view, but with a moderate amount of assistance, and with the knowledge gained from past experience, my opinion is that in a very short time we shall see many of them laid bare.

The reason of the poverty of our mining population is mainly owing to the long depression in the price of our minerals—consequently the ceasing to work the greater number of our mines. In 1870 we had west of Truro 16 mining districts, with 95 mines at work, employing over 20,000 people; and at the close of 1879 we had nine districts with 28 mines, employing about 6000 people, a deficit of 67 mines for materials and merchandise generally. Ironfounders and merchants must certainly tell a sad tale; the labour market is over-stocked, and many of the hands employed are earning a mere pittance of 7s. 6d. per week—hundreds not earning that amount. What we require is to put mines to work to employ our surplus labourers. Then comes the question, where can you find ground worthy of a trial? In reply, I will state that every mine recently abandoned, with few exceptions, is worthy of a trial, and I do not make the assertion without giving a reason for the faith that is in me—there are some who have committed that serious blunder.

With respect to the 67 mines abandoned I am quite satisfied they each and every one had a mineral lode in them, and which I will call the first or primary object. A painter of landscapes must be supplied with canvas, which he first primes, and suspends in his studio to dry, waiting the laying on of the paint to produce the picture desired. The 67 mines suspended are precisely in that first stage—waiting the laying on of paint to produce the desired effect, and the paint, or secondary element, to produce will in many cases be met with within a reasonable distance of the abandoned workings, as a cross-course such as made. Great Wheal Vor and many others rich, as a caunter, that produced such a wonderful effect in Crenver and Wheal Abraham and others. Two strata of ground—killas and granite—as in Dolcoath and many other rich mines in the districts of Redruth and Camborne. In many cases small veins forming a junction with the lode, termed by the miner droppers or feeders, as found in South Caradon Mine. Then there is the elvan course, and which rarely fails to produce a beneficial effect, as was found in South Crenver and many other mines.

I have been most careful in my observations for the last 15 years, and during that time I have never met with a single instance of a mine being productive without one or more of the foregoing causes, and I do not hesitate to affirm that there must be some of the before-named elements to produce the desired effect—to change a poor lode to a rich ore paying one. In support of my argument I may refer to a letter received in 1858 from one of the oldest, and in his day considered one of the best practical miners in Cornwall—Capt. Nicholas Vivian; also to one from the manager of Botallack—Capt. H. Boyns—in 1871 bearing on the point in question, and published in the Western Chronicle of Science in that year.

As one illustration of the doings of the old school I may say that a lode was discovered, and, as capital is supposed to be forthcoming, a shaft is sunk and levels driven on the lode without any enquiry after a secondary element. There is a rich-looking gossan and a soft priany spar—in fact, everything that could be desired by the old school; but the paint or main point lacking to produce the effect looked for. If I were to visit a mine having all the good indications above named my first enquiry would be, what stratum of ground is your lode in? The reply would be probably granite. My next question, is your lode likely to be disturbed by any other strata—killas for instance? If the reply were in the negative I should go still further, and enquire if there were a cross-course in the sett, or a caunter lode, elvan course, or droppers of any sort? Should there be none of the above named likely to come in contact with the lode my advice would be not to lay out another shilling, it being a keenly bal, and would be probably to the end of the chapter never sufficiently rich to pay cost, without one or more of the above-named secondary elements, A practical result or two may not be out of place at this point:—No. 1. Mellancar Mine, St. Erth, Hayle.—No. 2. Old Wheal Roam, now West Roskear, near Camborne. The mode hitherto followed in seeking our mineral riches has been very lax indeed—lax did I say? It has been a reckless wilful waste—so much so that capitalists have been disheartened and almost disgusted, notwithstanding the county's endless riches—no rule, order, or observation, the party in trust wholly ignorant of the laws of Nature—not unlike a mariner going to sea without compass, rudder, or chart on board his ship.

With the view of benefiting the country to the greatest possible extent I beg to propose a new society, as there is great need—the Inductive Scientific Mineralogical Institution—its object being the furtherance of science, and to find profitable and paying work for our working miners. Bad as their position is, to a man they would prefer labouring and receiving the 2s. 6d. fairly and manfully earned than receive 5s. from a relief fund not laboured for. The 2s. 6d. he considers he has a legal claim to; the 5s. he feels he has no right to, and when he accepts it with reluctance he feels the demoralising influence. It is permanent work the miners require, not temporary relief; and I am certain that the money would be forthcoming if we could but convince persons that there was a proper and safe channel for its employment, and in a very short time would be self-supporting.

It is fresh in my recollection when a liberal and discerning public raised a sum of money to purchase nets, &c., for certain destitute fishermen, to enable them to earn their livelihood by the sweat of their brow. Our destitute Cornish miners only require work, and I can show that there is paying work in abundance, I must not omit to introduce to your notice an old and dependable servant in Cornwall, but much neglected—the Dowsing-Rod. A friend has kindly furnished me with the following remarkable statement made some time since by Mr. Wm. Hewett, of Fowey. The late Dr. Cookworthy, of Plymouth, whose name is associated with the discovery of china-clay in Cornwall, was on terms of intimacy with Dr. Crapp, of St. Austell, and scientific subjects formed no inconsiderable section of the questions discussed between them. A point was adverted to at one time relative to the operation of the dowsing-rod, Dr. Cookworthy contending against the notion. Dr. Crapp, who held views on the contrary, entered into the following experiment, where his opponent was brought face to face with the question. A tub of sieve tin was sunk in the garden entirely unknown to the Plymouth chemist, and, on his visit to St. Austell, the dowsing-rod was placed in his hands with the request that he would operate in the said garden. Coming over the spot where the tin was placed the rod, held as directed, dipped, and then Dr. Crapp was free to tell his visitor all the circumstances of the case. One other proof, and then I hope you will be induced to experiment for yourselves. I received the following communication from Stockport, dated March 20, in which the writer (Mr. J. Tonkin) says:—I may remark that I am a firm believer in the dowsing-rod, although it is over 40 years ago since I handled one, and then it would not act in my hands; but when my instructor held the rod in position he asked me to hold one end of the same while he held the other, and such was the force with which it twisted, and my determination not to be done, that I recollect the bark coming off in my hand.

There is no hope for Cornish mining except in superior scientific and mechanical appliances; but these given, and the future may be as successful as the past. The hills and valleys of the old county (Cornwall) are as rich in minerals as ever, all that has been extracted being but a cypher in a hundred when mineralogical and geological science point with certainty to tin and copper deposits, avoiding the expense of tedious and uncertain experiments, and what otherwise could be reasonably expected of a progeny from such an uncertain parent—chance. When the workings are supplied with air as fresh as blows across the English Channel, expelling foul gases and quickening the miners' effective labours, no foreigh competition need be feared; the exhaustless recourses of Cornwall will continue to furnish a kingdom's need, and in the palmy days of the next century the rejoicing population will look gratefully backwards to the gentlemen who assisted to make mining in Cornwall a blessing and a success.—*Directory Office, Hayle, July* 26. J. WILLIAMS.

MINING IN LLANARMON.

SIR,—The Lady Ann Mine is situated east of Nant-Adda. It is comparatively speaking a young mine, not much having been done hitherto in the way of its development. Its geological position is equivalent to the western end of Bodidris. Pantdu, Maesysafn Mines, Nant, Castell, and Pant-y-gwlanod, are other places that have been successfully worked in the same measures, which are those overlying the dark limestone and shale, and underlying the Aberdo beds. There are five lodes to be seen in the sett, of which the most important are the Pant-y-gwlanod, Nant, and Middle lode, each of which, as we will have occasion hereafter to notice as we procced, has been exceedingly rich to the east. The extension of the Nant-Adda level to the Nant should be a matter of some interest to the gentlemen associated with this mine, as the driving of the adit would relieve their property of all surface water to the depth of 60 fms., and give splendid advantages to effectually develope the property with a small expenditure. Nant is situate immediately east of Lady Ann. It began its active history in the year 1842, and to the close of the year 1849 continued to give most favourable results. The four principal perpendicular shafts are the engine-shaft on the east, 70 fms. deep; Ellis's shaft, 90 fms.; Castle shaft, 90 fms.; and engine-fach shaft, on the west, 90 fms. I am informed that the ground standing over and above the 70 is rich in ore for over a quarter of a mile in length. The richest part of the mine appears to be between Castle and engine-fach shaft. In one place the lode is 2 ft. wide, filled with almost pure galena; in the other it is 3 ft. wide, containing galena 2 ft., carbonate of lime 1 ft.

Similar to most of the old mines in this locality and elsewhere operations were confined to the development of but one lode. The principal reason ascribed for its desertion is, that it had a formidable rival in the Bog Mine, which possessed those attractions most susceptible to the human heart—youth, wealth, and beauty. The old mine began to suffer from neglect, and this ultimately culminated in its being abandoned. But we think that the low price of lead ore at the time, and the amount of water coming into the mine at that period of the year, had more to do with its stoppage than anything else. It appears that at about 50 fms. from surface there is a large subterranean river running close past the engine-shaft, and this after a heavy flood being overcharged with water empties its surplus into the mine. To relieve the mine of this constant interruption the Nant-Adda adit level has been driven 330 fms. It is expected that this level will take all this water away, and make the mine a comparatively dry one.

It has been repeatedly asked what were the returns from that part of the Westminster sett called the Nant. In answer to such I append the following:—

Date.	Quantity—tons.	Average price per ton.
1842	109	£10 15 3
1843	718	10 7 1¼
1844	720	10 4 3½
1845	975	11 6 6¼
1846	824½	11 13 2½
1847	1025	10 1 2
1848	674	8 18 10
1849	380	9 3 2¼

Aug. 5. J. A. EDE.

The following were received from parties who, when young, worked in the mine:—

SIR,—I assisted to take up the pumps, and was engaged driving the adit when they were put down. To the west of engine-shaft it was very promising and producing ore. Some of the men offered to drive it free of all charge to the company. To the east I was working on tribute east of Ellis's shaft; the ground from this point to engine-fach is whole and contains a great number of splendid pitches; at engine-fach the lode east of shaft is 2 ft. wide and contains only solid lead. In a sump further east the lode is 3 ft. wide, containing 2 ft. solid and 1 ft. mixed with spar. This ore is on the bottom of the mine.

JOHN SHELDON, *Tydraw.*

SIR,—While working at the Nant six of us for 12 years raised regularly 12 tons per month; it is now a little poorer, but if more of the lode was carried it would be found on the heading. The men offered to drive the level west for 4*l.* per ton for a considerable time. GEORGE JONES. *Brynglock.*

MINING IN LLANARMON.

SIR,—Signs of improvement in lead mining are manifest in this district, and such ably written letters as that of Captain Ede's in the Journal of last Saturday week tend in a great degree to draw the attention of real investors in good lead mines to this promising locality. Mr. Humphreys, of Chester, is also doing good service in the way he mentions the district as being likely to be affected for good in the projected railway to come up from Wrexham as far as Llandegla. Important arrangements are also progressing at the Llandegla Mines, and I have it on the best authority, from copies of reports I have seen from four prominent mining engineers, that the Lady Ann Lead Mines will soon take a leading position, as arrangements are so far carried out that a company under the Limited Liability Act will shortly be registered to work this property vigorously; and I feel sure that capitalists and gentlemen interested in sound mining undertakings cannot do better than arrange to take an interest in this very promising mine. It is under the able management of Captain William Francis, of Northop; and Captain Parry, of Pant-y-Mwyn, Captain Absalom Francis, of Wrexham, and Captain Ede, of Lead Era, with Captain B. Williams, of

the Gwern-y-Mynydd Lead Mines, have all inspected it, and their reports are worthy the attention of anyone interested in lead mining.—*Aug.* 5. RESURGO.

MINING IN CARDIGANSHIRE

SIR,—I have read with much interest the letter of your correspondent, "Facts," in last week's Journal, and the very useful statistics on this subject which he has given. I think in justice to the great metallic riches of this highly favoured county such information as your correspondent has supplied cannot be too widely known, and it would be both useful and interesting to have a similar statement respecting Flint, Montgomery, and Carnarvonshire.

In regard to the non-dividend mines he instances, with a nominal capital of 283,000*l.*, it might be as well to remark that Frongoch has already reached the desirable crisis which removes it into the Dividend List again, and a similar remark will speedily apply to Bwlch United, where the dressing-floors have been recently completed, and where they are now busily occupied in dressing a very large accumulation of ore for market, and I may add that the Bwlch ore is remarkable for the large percentage of silver it contains.

Since your correspondent wrote his letter another 20,000*l.* must be added to his estimate of the nominal capital employed in non-dividend mines. The West Lisburne Mine, in the celebrated Lisburne district, is before the public, holding out strong inducements for the favour of legitimate investors, and from what I have gathered respecting the past history of the mine I am persuaded that with the good management which I am informed has been secured for it that it will speedily add another mining laurel to the Cardiganshire already brilliant wreath. ACTUAL FACTS.

London, Aug. 5.

MINING IN SHROPSHIRE.

SIR,—I wrote to your valuable Journal some weeks ago about the mines in North Shropshire and their productiveness; allow me now to make a remark or two about the western part of South Shropshire and its mining operations. In taking a tour upon the branch of the Welshpool Railway, alighting at its terminus at Minsterley, I took the road leading to Montgomery, at a place called Lee, where some small trials were made many years ago in search of lead ore. This place attracted my attention in former visits through the district, but leaving to someone more able than myself to take this matter up I shall travel on some few miles further, where there is a mine in full operation, called Wotherton Barytes Mine; it has been noted for years for its valuable barytes, and was, formerly worked by Mr. McGuiness, of Welshpool, but has been in the hands of the present company for about 13 years, who have raised and sold upwards of 30,000 tons of barytes at a cost of about 19,000*l.*, and I cannot pass this by without giving my opinion on the mine and its contents. Having had some 25 or 30 years experience in mining I will leave the readers of the Journal to judge as to my abilities. The mine is now 50 fms. deep, and they are making preparations for sinking 10 fms. deeper. This will be accomplished in about two months, as they have a powerful Robey engine, capable of pumping and winding, fixed up. The mine is still in its infancy. As the company have not extended their drivings more than 60 fms. in length, this end (west) should be driven on through the twitch, as there is every indication that the lode will open in a few fathoms driving to it's average width, that is from 15 to 25 feet, this will greatly enhance the value of the mine.

In the eastern end of the present workings I saw some nice stones of lead ore in contact with the rider stone coming in the lode, this has every indication that a lead ore lode is forming itself, as the barytes throws away west. In fact, its character is such that no agent of any repute would condemn. Knowing the mines south-east of this, I shall not be the least surprised to hear, when the shaft is sunk and the lode cut, of a rich bunch of lead ore being found at the Wotherton Mines.—*Salop, Aug.* 3. OBSERVER.

WHEAL HONY AND TRELAWNY UNITED MINES.

SIR,—As there has been some doubt thrown on the subject of forking, or the drainage, of the above mines, will you kindly publish the following letter from Mr. Matthew Loam, Liskeard. The opinion of so eminent an authority on the drainage of mines will, I trust, allay any feeling that may have been created in the minds of mining investors by the erroneous statements set forth by interested parties. I may add that Mr. Matthew Loam attended a board meeting on Thursday, accompanied by Capt. Josiah Thomas, of Dolcoath, and fully confirmed the statements made in regard to the value of the company's property. H. R. LEWIS, Secretary.

Bartholomew House, Bartholomew-lane.

WHEAL HONY AND TRELAWNY DRAINAGE.

SIR,—In reply to your favour of the 29th ult, respecting the drainage of these mines, the total approximate quantity of water in them is as follows:—Wheal Mary Ann, 160 gallons; Trelawny, 540 gallons: total, 700 gallons per minute. This equals a 20 in. lift, which we propose 5·14 strokes per minute, about half its maximum speed, and assuming that the full quantity of water is at the bottom of the mine. It is, however, a fact that a large portion of this water is from the shallow levels, at which point it can be intercepted, and thus reduce the speed of the pumps, and leave increased surplus power available in the 90 in. engine, which I recommend for the deep workings. You will see there is nothing to fear in the quantity of water or its drainage; on the contrary, it can be easily pumped, and when at surface can be utilised by ponding for dressing and other purposes. In fact for these purposes it is an advantage in being concentrated in the mine instead of as formerly being distributed throughout two.

Liskeard, July 1. MATTHEW LOAM.

EAST CARADON MINE.

SIR,—The letter of "Copper Ore" in last issue deserves the attention of all who are interested in this mine. There is every reason to expect that a new era of prosperity will, ere long, commence in the East Caradon Mine, which through fortune and adversity has always maintained an honourable reputation, to the credit of all who are or have been actively concerned in its management. The official reports of Capt. Kellow are marked by so plain, outspoken, and business-like a tone, and are so devoid of any semblance of puffing, that they cannot but carry a weight of conviction far surpassing that of the "highly coloured" and specious reports referred to by "Copper Ore." The following extracts from Capt. Kellow's last three quarterly reports are instructive.

Report, Jan. 13.—"The winze on the caunter lode at the 150: "At present the ground is not so favourable for sinking, but hope this is only temporary; the lode is 1½ ft. wide, composed of quartz, peach, and mundic, intermixed with a little ore."

Report, April 13.—"The lode is 2 ft. wide (composed as in our last report).

Report, July 13.—"The lode is 2½ ft. wide, composed of peach, quartz, and mundic, intermixed with some good stones of copper ore, with water issuing freely from same."

It will be observed from the foregoing that the lode has steadily increased—*pari passu*—in width and quality, and that "water is issuing freely." These are strong indications of the lode soon becoming productive, and the fact that the South Caradon Mine has several deep and valuable levels coming into and all productive and within 60 or 70 fms. of the boundary of East Caradon is, when taken in conjunction with the above facts, very significant and pregnant with a prosperous and near fortune.

I have confined my observations to the caunter lode, but would draw attention to the cross-cut south at the 130, in which Captain Kellow, in his report of the 13th ult., mentions the intersection of a branch about 4 in. wide, showing the ground to be mineralised; this is a decided improvement.

"Copper Ore" refers to what he correctly describes as "the lately comparatively high prices" of the shares; this being especially the case at the commencement of the year, when there was little promise of improvement, but I would point out that the intrinsic value of the shares at the present moment is twice and thrice what it was then, when the outlook was gloomy in the extreme, whereas now there is every reason to anticipate that the barren elvan, which has proved so destructive to the lodes, and is the cause of their unproductiveness, will soon be worked through, and this accomplished the lodes will, doubtless, again yield ore in quantity and quality as of old. Miners and mining experts will readily appreciate the fact of the lode steadily increasing in width and quality while yet in the elvan, and of the water issuing freely. In short, it is strong presumptive evidence of the beginning of the end of the elvan.

It is these indications which, taken together, and when calling to mind what the mine yielded in ore, and paid in dividends before the lodes touched the elvan, give the East Caradon and its shares so great a prospective value; and as a shareholder, I would strongly urge fellow-shareholders not to part with their shares just when fortune may be within their grasp, but to hold them, and not allow speculators to reap the fruits of their patience and faith in a property soundly conducted and rapidly increasing in value. The mine has had adversity to contend with, but it has weathered the worst of the storm, and few mines at the present time have a fairer prospect before them than the East Caradon. It may be added that the mine is well supplied with machinery equal to all requirements for years to come.—*Aug.* 4. N. T. B.

THE MOLD MINES COMPANY.

SIR,—Some ten years ago a company was started called the "Mold Mines Company (Limited)," with offices at the Town Hall, Chester. The company came under liquidation, and in August, 1878, it was disposed of to a then new company, called the Gwern-y-Mynydd (Limited), for 17,500*l.* in cash and shares, to be appropriated among the shareholders of the Mold Mines Company. It is now August, 1880, and no such appropriation has yet been made, nor do the liquidators furnish accounts as requested, although the Gwern-y-Mynydd is a going concern, and the shares are quoted in your valuable list. It is a very hard matter when shareholders cannot obtain the small satisfaction of even an account of what has been done with their money, and poor losers cannot always afford legal expenses to compel information. Can some reader inform? If not, would you kindly call attention to this and oblige your reader and— A SHAREHOLDER.

Brighton, Aug. 5.

[For remainder of Original Correspondence see this day's Journal.]

Registration of New Companies.

The following joint-stock companies have been duly registered:—

BUCKS LAND AND BUILDING COMPANY (Limited).—Capital 10,000*l.*, in shares of 10*l.* To carry on the business of a land and building society. The subscribers (who take 50 shares each) are—G. Butcher, Aylesbury; F. G. Butcher, Aylesbury; R. Dickens, Aylesbury; W. Whiting, Aylesbury; J. K. Green, Aylesbury; T. Howard, Aylesbury; A. M. James, Aylesbury; J. Gurney, Aylesbury; J. Mumford, Brill.

THE NORTH SNAILBEACH LEAD AND BARYTES MINING SYNDICATE (Limited).—Capital 5000*l.*, in shares of 1*l.* To purchase or otherwise acquire from any estate the mines, mineral properties, and ores known as the North Snailbeach Lead Mine, near Shrewsbury, Shropshire, with all the rights, privileges, machinery, implements, and effects. The working and developing of mines and minerals, the sale of all ores and minerals, and generally to carry on the business of a mining company in all its branches. The subscribers (who take one share each) are—S. Lawder, Eaton, Northwich, gentleman; C. S. Sherwood, 32, Theobald's-road, clerk; P. K. Langdale, 30, Bedford-row, solicitor; B. H. Luxmore, 36, Bedford-row, clerk; U. H. Cousins, Rochester, surveyor; C. E. Laughton, Clapham, gentleman; F. Goldring, 32, Theobald's-road, surveyor. A directors' qualification is fixed at 100 shares.

NORTH-WEST WESLEYAN METHODIST SCHOOL ASSOCIATION (Limited).—Capital 20,000*l.*, in shares of 1*l.* To establish and carry on in Wales day and boarding schools. The subscribers (who take one share each) are—E. J. Guest, Warrington; J. Thorp, Beechwood; J. Napier, Manchester; W. Dutton, Hillside; E. Hutchinson, Liverpool; R. Haworth, Dewsbury; W. McHenry, Banbury.

THE ENFIELD STUD AND RACECOURSE COMPANY (Limited).—Capital 12,000*l.*, in shares of 5*l.* To carry on the business of a stud and sporting company. The subscribers are—F. Bashford, 206, Earl's Court-road, 5; P. Mitchell, jun., Enfield, 1; G. Archer, Enfield, 2; E. G. Jackson, Finsbury Park, 1; B. Mitchell, Craven Hill; J. D. Jackson, Crouch Hill, 1; C. O. Kamienski, St. John's Wood, 1.

THE ELECTRIC AND MAGNETIC COMPANY (Limited).—Capital 500,000*l.*, in shares of 10*l.* The supply and maintenance of electric and magnetic lights all over the world. The subscribers are—D. Campbell, 7, Quality-court, 25; W. R. Robinson, 50, Norfolk-square, 25; J. T. Campbell, 17, Warwick-street, 1; S. Canning, 7, Great Winchester-street, 1; A. C. Macrae, 119, Westbourne-terrace, 25; M. R. Pryor, 12, Great Winchester-street, 25; R. Falnie, 7, Great Winchester-street, 1.

THE SCOTCH BANK (Limited).—Capital 50,000*l.*, in shares of 5*l.* To carry on the business of bankers. The subscribers are—H. J. Fairman, Hammersmith, 150; J. A. Fallen, 42, Dumont-road, 20; W. G. Fairman, Bow, 150; W. Morrison, 42, Fish-street Hill, 10; J. S. Swanson, 17, Great Winchester-street, 5; F. Bonez, Walthamstow, 10; E. G. Thomas, Sheffield, 5.

THE MARINE PIERS COMPANY (Limited).—Capital 200,000*l.*, in shares of 5*l.* To construct and maintain promenade and landing piers. The subscribers (who take one share each) are—T. Ross, Hastings; J. Ellis, Balcombe; W. Stephens, Tulse Hill; J. McMillan, 5, Paper Buildings; W. E. Bendle, 86, Redcliffe Gardens; W. Berrill, Clapham; F. E. Robinson, Clapham.

THE STANDARD UNION INVESTMENT COMPANY (Limited).—Capital 50,000*l.*, in shares of 1*l.* To invest in purchase and sell businesses, goods, &c. The subscribers (who take one share each) are—A. Hoge, Kingston-on-Thames; C. H. Holmes, 5, Bevington-road; A. T. Sullivan, Grove Hill-road; D. Cowie, Bromley; C. W. Turner, 18, Alma-road; T. Coomber, Felbridge; E. R. Phillpotts, 74, St. James's-street.

THE ENGLISH AND CONTINENTAL CO-OPERATIVE COAL COMPANY (Limited).—Capital 20,000*l.*, in shares of 1*l.* Buying, selling, and dealing in coal. The subscribers (who take one share each) are—C. S. Owen, 60, Darnley-road; G. Owen, Paris; H. Owen, 60, Darnley-road; E. Wicks, Brixton; W. J. Smith, Camberwell; J. B. Jones, Brixton; W. H. Turner, Clapham.

THE WHINNAH MINING COMPANY (Limited).—Capital 120,000*l.*, in shares of 100*l.* To acquire by purchase or otherwise any mines and quarries of iron ore, ironstone, copper, lead, limestone, fire-clay, freestone, &c., and in particular the mines, minerals, and premises situate in the parish of Lamplugh, Cumberland, for the purpose of holding, working, and selling the produce thereof, or otherwise disposing of same, and generally to carry on the business of miners and smelters in all branches. The subscribers are—J. Webster, St. Bees, gentleman, 5; A. Helder, Whitehaven, solicitor, 15; T. H. Brocklam, Whitehaven, solicitor, 5; J. R. Musgrave, Whitehaven, gentleman, 5; J. Jackson, Whitehaven, timber merchant, 5; H. Woolcock, Whitehaven, mining engineer, 15; M. Kennedy, Ulverston, gentleman, 5. The first directors are—Messrs. Webster, Musgrave, Jackson, Woolcock, and W. Fletcher. The number at no time to exceed six or be less than three. Qualification five shares.

"DELACRES" 'LA PLATA' EXTRACT OF BEEF COMPANY (Limited).—Capital 100,000*l.*, in shares of 10*l.* The preparation, manufacture, and vending of a certain extract of meat, and to grant licenses for the manufacture and sale of same. The subscribers are—W. R. Barker, 143, New Bond-street, 200; A. E. Edge, Upper Norwood, 300; G. Badham, 3, Salters's Hall-court, 50; H. B. Sleeman, 37, Lime-street, 100; A. Bennetts, 49, Oxford-street, 5; J. S. Newlyn, Dulwich, 5; C. Geard, 33, King William-street, 1.

THE BENHAR COAL COMPANY AND THE BROXBURN OIL COMPANY.—We understand that an agreement has been just concluded between the Benhar Coal Company and the Broxburn Oil Company, under which the former, for the payment down of about 50,000*l.* cash, transfer their oilworks to the latter company. This sum includes the purchase price of the Benhar stock of oil, valued at 6000*l.* or so. It may be remembered that the Broxburn Oil Company recently endeavoured to reduce a bargain which bound them to supply the Benhar Company with 300 tons of shale per day, but that the Court declined to set the arrangement aside. The result now arrived at is the outcome of the negociations that thereupon followed. The terms are regarded as favourable for both companies, for it places the Benhar in the immediate possession of a large sum of money, and, at the same time, relieves the Broxburn from supplying nearly 80,000 tons of shale annually at a figure several times below that which it realises when utilised by themselves in their own works. — *Glasgow Herald.*

THE COLLIERY EXPLOSION IN NORTH WALES.

Another explosion, resulting in the death of eight men, has to be recorded in North Wales, and from a cause that was really preventable, but under somewhat singular circumstances. It appears that about 7·30 on Tuesday evening a number of workmen were engaged in the Benham Colliery, Wrexham, on what is termed the evening shift, when a shot was fired, which exploded a blower of gas. Evidently this had not the effect of gathering any large amount of force by coming into contact with a heavy body of gas in other parts of the mine, so that the men on being ordered out were able to reach the surface in safety, otherwise there would have been a far more serious loss of life. About 10 o'clock the same night there was an explosion, showing that there had been a considerable accumulation of gas since the men left the mine, and that the gas met with earlier on in the evening having ignited came in contact with a much larger body. Shortly after the explosion, about one o'clock, Mr. PATTISON, the manager, with four colliers and four firemen, descended the pit to see what damage was done. At that time there is no doubt the fire was raging in the bottom, or if not so, or there was an accumulation of carbonic acid gas which suffocates. However that may be, the manager was found dead, and with him seven of the other men, one only having been found just alive, and removed to his residence and left there in a very precarious condition. We have here another illustration of what we have so frequently pointed out, the danger that must always exist in using gunpowder in mines where gas is known to be frequently met with. Shot firing has led to a greater loss of life at a time than anything else, yet it is carried on in mines where gas is constantly met with as if it were a harmless way of bringing down coal, and the miners evidently think that it is not likely to lead to injury, especially where it has long been carried on without damage to person or property. But sooner or later this reckless system results in death and destruction, and in but few instances are any of the victims left to give their opinions as to the actual cause.

It is true that the Wrexham coal field has not been considered a fiery one, but it must be recollected that it is only within a comparatively few years that deep shafts have been sunk in it, and it is admitted that the deeper the beds of coal there will gas be found the most abundant. The comparative safety which has attended mining operations in the district during the past should not be considered sufficient to allow of the coal being now raised in the same way when the conditions are so different in every way. Twenty years ago there were no actually deep collieries in the county, the Westminster being about the deepest, 173 yards from the surface. Since then, however, some very deep pits have been sunk, the Hafod, near Ruabon, being upwards of 500 yards from the top to the bottom of the shaft. The result is that there has been a vast increase in the quantity of coal raised, for whilst in 1858 it only amounted to 527,000 tons, it is now being got at the rate of 1,600,000 tons, the collieries having more than doubled during the two periods. Therefore with much deeper shafts and such a vast increase in the output of coal more than the old precautions are necessary to ensure the safety of the workpeople. It is all very well to say that the ventilation of a mine is particularly good—and that is generally said to have been the case at those where an explosion has taken place; but this we do know, that there was not sufficient air passing to neutralise the emissions of gas and prevent them becoming explosive. The firing of a shot may liberate gas and then ignite, as has evidently been the case at Wrexham, or there has been a considerable accumulation that only required a light to ignite, and to kill those who were at all near to it. The cause of the explosion was undoubtedly the firing of the shot, and the question may well be again repeated as to how much longer will the use of gunpowder be allowed in mines that are known to give off a good deal of gas from coal or other strata?

REPORT FROM CORNWALL.

Aug. 5.—We seem to be again at a lull in mining affairs, though in the complicated state of the operations in the tin market it is not easy to say whether the course of events is likely to follow immediate anticipations. This much is certain, that whatever may be the general current of the market, with an increasing demand, and a supply which is certainly not progressing in an equal ratio, if, indeed, just at present it is progressing at all, we have, on the other hand, arrived at a dull period of the year, and at a time, too, when extensive complications in the East and in India are certain to do their part to unsettle trade, We do not believe these influences are likely to throw the market back, but they are sure to retard its progress, though even that forecast may to some extent be qualified by the result of the speculative action which has been so unhealthily rife. We do not know precisely to what extent the "bears" may have committed themselves, or to what efforts they may be forced, though judging from present appearances the "bulls" are likely to have an "all round" best of it. If the private history of the tin market during the past six months could be made fully public it would be very curious and very instructive reading. Bit by bit some little matters do leak out, and they are not without their influence. We believe the era of wholesale speculation is passing away for a time and giving place to more legitimate influences, but the system will die hard for all that, and for a long while there will be a danger of its resumption. Some speculation of course there always will and must be, but the speculation that is based upon false issues of supply and demand must in the long run prove mischievious, as we have had ample experience.

No importance whatever is to be attached to the reduction of the tin standard by the smelters to-day. It is a movement in sympathy rather with what was feared than with the actual condition of the London market, and of so little influence that shares have notwithstanding advanced somewhat, and that a good business has been done. The advance in the standard for copper ore at Redruth to-day is also a very satisfactory sign.

We are glad to know that the tin ticketing system is not growing in appreciation of late, and that in all probability it will ere long die out. It has never taken a firm hold of the mining mind for reasons which we have again and again pointed out, and its working has proved, if not a "snare," certainly a mocking and a delusion. Grand as were its promises its performances have been all but nil, and its latest efforts have shown no advantage whatever over that which it sought to replace. The sooner it goes the better. It is always good to get sham reforms out of the way, for they stand in the road of real ones, and this ticketing business has been little more than a sham from the very beginning. It did not require very much acumen of knowledge of mining affairs to feel, as we always have felt, that it would be a failure, though we thought it might have a longer trial than is at present likely.

We are glad to see Mr. Symons calling attention to the dues question, *apropos* of the recent action taken at Dolcoath, though we think that the adventurers there would have good reason to complain, notwithstanding the conditions of their lease, if the demand were enforced. Again and again have we contended that the only fair way of levying dues is upon profits, with fair rental, and fair compensation for surface damage, but the matter has never been taken up in earnest. However, if anything is to be done—and sooner or later that must be the case—it will be by "pegging away," and Mr. Symons (though we would not commit ourselves precisely to his figures) does well to help to keep the question alive. We are afraid, however, that the time is not exactly favourable. A golden opportunity was lost for the introduction of the thin end of the wedge during the depression, but others will present themselves to those who are in earnest in looking for them.

For a long time past Mr. J. H. Collins, F.G.S., has been engaged in the microscopical examination of the Cornish tinstones and tin capels, and has collected a great mass of valuable results—valuable that is

chiefly at present in a scientific point of view, but with a very practical bearing also. A first instalment of these he has just published in the Journal of the Mineralogical Society, illustrated by several coloured plates, and forming one of the most important contributions to Western science that has for a long time appeared. When completed the paper will assume the shape of an exhaustive monagraph on the physical conditions and structure of our tin ores and stanniferous rocks. We need hardly say that the work is admirably done.

The Miners' Association are this year to make their annual excursion to Wheal Eliza, a mine which, under the management of Capt. Williams, has done literally wonders, and the works on which have several points of special practical interest.

The figures of the copper ore sales for the twelve months ending June 30 are in one view decidedly encouraging, inasmuch as they show alike an improvement in price and an increased production in the leading mines. In point of comparative advance Wheal Crebor stands first, having quadrupled its sale—from 539 tons to 2212, and this fact should point to the lesson which has been so often insisted upon—that there is an abundance of copper ore still left in the district if only it is sought for in the right place and in the proper way, and that in spite of the present financial condition of the copper market, copper mining in the West may even yet see a substantial revival.

Anyone who has not passed from Grampound Road to St. Austell by road for the past six months would look with amazement on some moor or gorse ground about four miles from St. Austell, and wonder how so many buildings could have sprung up, and a solid road has been made through a rough and apparently barren waste. The mind, however, is soon set at rest when a board is reached indicating that the shareholders in the Fortescue Stannagwyn Native Tin, Copper, Silver, and Arsenic Mine Company are the proprietors. A visit to the mine, and it is well worth it, will convince the most sceptical in mining that there is not only a very unusually rich mine, but that great energy and considerable skill has been displayed by those having the management. The agents have orders to show visitors everything.

REPORT FROM NORTH AND SOUTH STAFFORDSHIRE.

Aug. 5.—The pig-iron market at the meetings of the trade this week was very strong. Hematities of Lancashire and Welsh make were advanced a further 5s., making them 4*l.* per ton. Negociations are being conducted with American buyers at this price, but it does not yet appear that a large business is likely on American account. Ordinary consumers refuse to purchase, seeing that Staffordshire all-mine pigs are plentiful at 3*l.* 10s. per ton. Agents of Derbyshire, South Yorkshire, and Northampton pigs are doing more business than formerly, still sales are checked by the higher prices that they demand.

The manufactured ironmasters express satisfaction that the example of Messrs. Phillip Williams in reducing marked bars 10s. per ton, making them 7*l.* 10s., has not up to the present been followed by any other of the "test" houses. These latter still quote 8*l.* per ton. The effect upon the market of the drop has not been so injurious as had been feared. Other iron has not been much affected, sellers firmly demanding the prices that prevailed a week ago. Sheets show a rise upon the late minimum of 25s., making "singles" 8*l.* and "doubles" 9*l.* 10s. The galvanisers are asking an advance of between 20s. and 30s. per ton, and one important Wolverhampton firm have withdrawn their quotations, and intimate that all orders must be the subject of special prices. The strip makers quoted 5*l.* 15s. and upwards.

A memorial is in course of signature amongst the mineowners in the Tipton district which aims at the exclusion of that district from the drainage area under the control of the South Staffordshire Mines Drainage Commissioners. By the terms of the statute any district having obtained the requisite majority of signatures can "petition itself out of the Act." Oldbury and Bilston have already done this. As a result, Bilston is practically drowned out, and the success of the movement at Tipton would result in the drowning out of that district also, with but rare exceptions. Such a condition of things would be gravely disastrous to the busiest localities in South Staffordshire. There is some reason, at date, to fear that the petitions may be successful.

Another meeting of miners in the Cannock Chase district has been held this week, to ascertain their opinion as to whether the Birmingham agreement should remain in force for another twelve months. It was stated that a deputation had waited upon the employers in Birmingham, and that they were willing to let the agreement remain in force for another twelve months if the men would do so; but if not, then there must be 3d. per day reduction, or one hour per day added to the working time. It was decided to work under the agreement until Aug. 12, 1881. It was also resolved to organise the men throughout the district. The colliers are now being paid 2s. 6d. per day. Thus the wages difficulty, to which I referred a week ago, has so far been amicably settled. ——

Murderous Attack on a Colliery Proprietor.—Mr. Thomas Glaze, of Straits Colliery, near Sedgley, a well-known coalmaster in the Black Country, when returning home on Wednesday night was murderously attacked by a collier named Thomas Malpas who had been refused an advance of wages. Malpas came from under a hedge and rushed at Mr. Glaze, threatening him with death, breaking his shoulder bone, and inflicting several wounds. He was apprehended in a pit on Thursday, brought before the magistrates, and committed for trial.

REPORT FROM DERBYSHIRE AND YORKSHIRE.

Aug. 5.—In the lead mining districts business has been going on much as usual, but there does not appear of late to have been any marked increase in the production of ore, some of the mines, in the hands of ordinary workmen, yielding comparatively little. In the early part of the week several of the mines were visited by the Engineers' Association, and were well entertained by Mr. Wass, who is the principal lead-mine owner in the county, having the best of machinery and appliances at his various places. That appears to be the true secret of success; for where men delve in the old-fashioned way they do not earn more than ordinary workmen's wages. Not much iron ore is being raised, there having been a considerable falling off of late years, so that the ironmasters of Derbyshire depend principally on Northamptonshire for their supplies. There has been a tolerably fair business done in pig, prices continuing firm, and with every appearance of their continuing to do so. In manufactured iron a steady business has also been done, but not to the extent of keeping the mills as fully employed as they might be. Some of the foundries are fairly off for work, especially in gas and water pipes. The coal trade, taken altogether, is still quiet, and the pits not fully employed. House coal does not go off well, and the price at which it is sold is not remunerative. At once place it is about to be sent from a pit into the villages by means of a traction engine. Steam coal, however, meets with a more ready sale, whilst coke is still in fair request.

In Sheffield trade is getting more brisk, and the rail makers in particular have just received some heavy orders that will keep them fully going for some time to come. The plate and sheet mills have also been working well, and there has been a good enquiry for axles, tyres, and ordinary railway material. Makers of crucible steel are now much better off than they were, and there is every prospect of a tolerably active season, as America continues to send some good orders. Armour-plates of the new pattern, steel-faced, have been made for experimental purposes on the part of our own Government. Edge tools and sheep-shears are still in good request, whilst the large cutlery houses engaged on the better class of work are doing well, but so much cannot be said with respect to the smaller establishments.

The South Yorkshire Coal Trade is still dull, so far as households are concerned, and owners have to sell at prices by which they cannot realise any profit, but in most instances a loss. On the other hand, however, steam coal goes off well, this being about the busiest time of the year for it, as the shipments to Russia and other ports of the North of Europe are usually large. Russia, indeed, has been taking a very heavy tonnage of late from the district, and as it is hard it is able to be put on board vessels, and withstand climatic influences much better than the North Country or the South Wales coal used for steam purposes. Engine fuel is still in but moderate request for the Lancashire and other manufacturing districts. Coal still sells well, and the productive power is increasing.

Owing to the state of trade and the unprofitable nature of the coal trade the Barrow Hematite Coal and Iron Company have discharged nearly all the miners lately employed at their large colliery near to Barnsley. Only some 40 or 50 are now employed at it, and there is but a poor prospect of the discharged hands finding employment at other places, seeing that the collieries in the district are working short time.

REPORT FROM NORTH WALES, SALOP, AND CARDIGAN.

Aug. 5.—Mr. Humphreys has burst upon us so suddenly with his narrow gauge railways that he must not be surprised if the people in the districts he seeks to serve do not take up his schemes as warmly as he propounds them. Seeing that the Minera and Brymbo districts are well supplied with railways, which may be adapted to passenger traffic, would not a branch railway—narrow gauge if it is deemed desirable—from the Mold and Denbigh line up the valley of the Alyn to Llanarmon and Llandegla be sufficient. As regards the Vale of Clwyd, it is well served from the colliery districts. The Vale of Clwyd Railway from Rhyl and the North Flintshire collieries, the Mold and Denbigh from both the Flintshire and Denbighshire collieries through the Wrexham, Mold, and Connah's Quay Railway, and by the Great Western from the Ruabon coal field. However, the best plan for Mr. Humphreys is to make his surveys, prepare his plans, and then call public meetings in his district, and submit his proposal for approval or otherwise. As a matter of economy he may do the last first. Then as to Cardiganshire, a narrow guage railway into the mining districts has often been advocated in these reports, and a survey offered if only moderate support could be obtained, a proposal which so far has not elecited a single response. The line I should propose would be a narrow gauge one, starting from the Cambrian Railway near the station and shipping place of Glandovey, keeping well up on the hill-side by Treidol, Taliesin, and Talybont, creeping up the valley towards the Blaen Caelan, Cambrian, Eaglebrook, Camdwr, and the other mines of that region, then winding down to Goginan, and on to Aberyswith, taking in as many mines as possible on this latter part of the route even if a longer distance were traversed. If somebody would turn their attention in good earnest to the construction of a railway of any gauge up the Tanat Valley to the mining district of Llangynog he would be doing good work for himself and for others. Again, the report is current that another railway much needed in Wales—the one from Bangor to Bethesda—is to begun immediately. This is a line that ought to have been made years ago.

A run through a portion of the slate districts of North Wales shows me that the slate trade is not yet in a brisk condition. At the Mold Junction slate depot there is a very full stock of slates, and there is but little loading going on. At Port Dinorwic a large number of vessels are lying idle. There are a few more signs of life on Carnarvon quay, but loading does not seem brisk there. The junction of the North Wales Narrow-Guage Railway with the London and North-Western Railway is characterised by the same deadness, and although work goes on in Nantlle, it is more of a preparatory than of a productive kind. Perhaps I should have said "reparatory." for the present system of working the quarries in this valley entails a great deal of work of this kind from the frequent falls of debris into the quarries, besides occasional loss of life. Only last week William Williams, who was employed in building a wall at the Coed Madoc Quarry, was killed instantaneously by the ground giving way beneath him, and precipitating him a depth of 50 yards. Among the attractions at the forthcoming Eisteddfod at Carnarvon is to be a slate splitting competition between the men of Merioneth and those of Carnarvonshire. I would suggest that besides trying the slate blocks of their respective districts each competitor should try those of the other county. Then there are to be brass band contests, in which the quarrymen will be largely engaged, for the valleys and quarries now resound of an evening with the discordant notes of practice.

John Williams was killed on Saturday week by falling down a shaft at the Fron Fawnog Lead Mines, near Mold. The Government Inspector having visited the place a verdict of "Accidental death" was returned. A fatal accident has also occurred at Trefonen Colliery, near Oswestry. Edward Dyke was killed on Sunday night by falling down a shoot. The inquest is adjourned. Owing to the low price of lead I regret to say that a large number of men have been discharged from the North Hendre Lead Mine, Flintshire.

The St. Martins Colliery Company, who with some reflection on the former company succeeded to the late Ifton Rhyn Colliery Company two years ago, have come to grief, as might have been foretold from their manner of working. The successful future is reserved for those who will win the ordinary coal measures in the property.

THE TRADE OF THE TYNE AND WEAR.

Aug. 4.—There is not much change to report in the coal trade, but shipments are maintained. At Tyne Dock and at most of the large docks in both rivers the shipments have been large. On the whole, the imports into the Tyne continue to increase at a considerable rate, and this affords ground for hope that the coal and other staple trades of this district will also continue to increase, as vessels bringing cargoes have required, or at any rate prefer to have, cargoes at the port of discharge. A marked increase in shipments of coal and other products at the port of Blyth has taken place during the year. Nearly 500 ships and steamers have taken coals from this port during the present year, being an increase of 100 vessels on the corresponding period last year; the amount of tonnage owned in Blyth is much greater than for some years back. Extensive improvements are being carried out by the Harbour and Dock Company in order to make the harbour more accessible for vessels of larger size than those now loading there. This port is admirably situated for shipping the best class Hartley steam coal, the cost of haulage to this point being much less than the cost to the Tyne, and if large vessels can be accommodated there the increase of the coal trade is certain to follow.

The Durham miners' annual meeting took place on Saturday, when a very large number of miners attended. Speeches were made by Mr. Forman, Mr. Crauford, and others. Mr. Crauford spoke at some length on the Employers' Liability for Accidents Bill, and contended that the principle of the Bill was founded on justice, and that if the Bill passed it would have a tendency to prevent accidents in mines, and especially explosions. Mr. Burt also strongly advocated the Bill, and both those speakers commented on the fact that this district has happily escaped for a long period any serious pit explosion, and also expressed the opinion that the coalowners and agents have endeavoured without reference to expense to make the mines safe and healthy for the workmen. Mr. Crauford also remarked that it was a disgrace to the science of the age that these lamentable explosions should occur, and certainly the science of the age ought to provide a remedy.

The remarks of those gentlemen respecting the agents, &c., at the mines of the district we can fully endorse; at the same time it would be unfair to assume that what is done in one district can with ease be effected in others. There are many circumstances which conduce to the safety of the mines in the North; there are, of course, many extensive pits where explosive gas is produced in abundance, but on the whole the positlon and thickness of the seams are favourable to their thorough ventilation. As a rule the seams are of moderate thickness, and the roof pretty firm, and the inclination of the seams is not great. The men have also been trained from youth to the use of the safety-lamp. The Davy lamp was introduced here in 1815, at a time when explosions of fire-damp were of frequent occurrence, and its use has been gradually increased, until at the present time all fiery mines are worked with locked lamps. The pits are also well manned with able officers, and thus safety does not depend entirely on the manager and a small staff of officers. The coal mines in Wales and many other districts have many features which differ from the mines here. The seams are many of them of great thickness, and the seams or veins lie at a considerable angle, and often there is a soft friable roof. Thus at Abercarn and Risca the difficulties met with in reopening after an explosion are almost insurmountable. We have seen many great explosions here in former times, but the task of reopening was comparatively easy when compared with these cases.

No doubt the men in Wales and other districts are improving daily, but until recently they had a great objection to working with safety-lamps; they contended that an open light was necessary to enable them to do their work. That they will in time be trained to use the safety-lamp there is no doubt, and it is also evident that some improvements must be introduced in the ventilation of those mines which will prevent those large accumulations of gas, the primary cause of explosions. Probably additional shafts will be require in the rise side of the measures. The miners' meeting at Durham must be considered a decided success; upwards of 30,000 men attended, and this large Union, which has passed through some vicissitudes of late years, is now again firmly established and consolidated. The coal trade, although a large business is done, is still in a depressed condition, the house coal trade especially, and only few works are realising a fair profit. The returns of the accountants in the Durham sliding scale show that the net average selling price of coal for the four months—March, April, May, and June, 1880—was 4s. 5·25d. per ton, a very low price.

The North of England Institute of Mining and Mechanical Engineers' annual meeting will be held in Newcastle-on-Tyne on Saturday, when the officers for the ensuing year will be elected. A number of members stand for election, and the following paper will be read:—"On Rapid Sinking," by Mr. Henry Hall, one of Her Majesty's Inspectors of Mines.

The Iron Trade both here and at Glasgow have been fluctuating; but, on the whole, it is decidedly improving. The demand from abroad has been remarkably good for the time of year, and advices from the United States and from the Continent are more cheering than for some time past. On Tuesday last Cleveland No. 3 pig-iron was 44s. to 45s. Messrs. Connell and Co. hold 92,000 tons. Engineers and ironfounders are only moderately well off, and their orders are rather scarce, while their prices are steady. The finished iron trade is getting into a more satisfactory condition every day, and the manufacturers regard the outlook as very encouraging. Prices are likely to rise. The plate trade is very active; prices are firm. Ship-plates, 6*l.* 16s.; angles, 6*l.*; common bars, 5*l.* 17s. 6d. to 6*l.*; puddled bars, 3*l.* 17s. 6d.

At Middlesborough, on Tuesday, there was a rather thin attendance at the opening of the market, but it improved towards the close. Makers are very firm, owing to the good shipments and the general prospect of demand. There has been a little increase in warrant stores. Warrants are 45s. No. 3. There is a good enquiry for pig-iron, and 44s. freely offered. There are renewed enquiries from America, and more orders are expected from that quarter for crude iron. There has been a good delivery coastwise and to Scotland lately, and also a large delivery to the Continent. There are more orders also for finished iron. The iron rail trade has been slack lately. There is a great demand for ship-iron of all kinds. The iron foundries are moderately employed. Coal and coke in moderate demand. The prices of manufactured iron are firmer. Plates, 7*l.*; bars, 6*l.*; angles, 6*l.* 2s. 6d.; puddled bars, 4*l.* to 4*l.* 2s. 6d.

REPORT FROM THE FOREST OF DEAN.

Aug. 5.—There is not much of interest to report with regard to the Coal Trade, which, however, is less depressed than during some former summers. In West Dean there is not much activity, but hopes are entertained of speedy improvement. The Tin-Plate Trade is rather languid, except at Hawkwell, but full and regular work is found for the workpeople. Trade is slack at the forges, nor is smelting extensive at the iron furnaces, and the same may be said of iron mining, but ore getting is continued at various mines. The railway extensions promised by the Great Western Company are still in abeyance. The Forest Junction Railway, although its rails have been laid several months, is kept idle and unopened, which cannot be carrying out the intentions of Parliament in granting powers for its construction.

FOREIGN MINING AND METALLURGY.

Coal quotations in Belgium have experienced no material change. The general aspect of the Belgian coal trade is good; the demand for coal for industrial purposes follows naturally the course of the iron trade, and as orders are abundant just now for iron there is a considerable demand for coal. A good crop of sugar beet is also anticipated in Belgium this year; should this anticipation be realised the demand for Belgian coal will be further increased to the extent of about 100,000 tons. The retail coal trade presents some little improvement in France. The aspect of the German coal trade continues very good, prices being maintained with great firmness, while an advance is regarded as not impossible; under these circumstances colliery proprietors are generally full of hope. The production of coal in Germany in the first half of this year shows a sensible increase as compared with the corresponding production in the same period of last year; notwithstanding this prices have improved to the extent of 1s. 3d. or 1s. 8d. per ton. During the second quarter of this year the extraction effected in the Dortmund district amounted to 5,123,116 tons.

In connection with a recent adjudication of 23,000 tons of steel rails required for the Belgian State Railways, it may be stated that contracts have been finally let as follows by the Belgian Minister of Public Works:—Seraing, 10,000 tons at 6*l.* 6s. 6d. per ton, and 5000 tons at 6*l.* 8s. per ton; Angleur, 5000 tons at 6*l.* 6s. 6d. per ton, and 3000 tons at 6*l.* 8s. 10d. per ton. The 23,000 tons will thus be obtained at an average of 6*l.* 7s. 2d. per ton. An English offer at 5*l.* 19s. 3d. per ton made by telegram does not appear to have been followed up by any letter. The administration of the Belgian State Railways has given out orders for 40 goods engines and shunting engines. The price at which these engines are to be supplied is about 24*l.* per engine less than the corresponding price at which the last orders were let; this is due to the present comparative cheapness of raw materials. The upward current in prices which appears to have been noticed of late in the Belgian iron trade has acquired rather more strength and force. Good news comes to hand, indeed, from all sides except France, where business is still comparatively dull. Scrap iron has been firm in Belgium at 5*l.* 4s. per ton, and even at 5*l.* 8s. per ton some important orders having been given out on export account at the latter price. Other qualities of iron have been generally in good demand. Plates have slightly advanced; they may still be procured at 7*l.* 4s. per ton, but it is doubtful whether this price could be obtained in the case of orders for distant dates. Belgian pig is obtained with difficulty at 2*l.* 8s. per ton, and the general tone of business is decidedly hopeful. The Atlas Blast-furnace Company, which was established in 1874, is about to devote itself to the manufacture of steel.

Confidence has revived in the German iron trade, the intelligence to hand from England and the United States having created a good impression. Quotations for pig and rolled iron show considerable firmness, and although there has been no material advance, orders have been numerous. Bessemer pig has especially been in good demand. The annual production of steel in Germany is now computed at 820,000 tons; in this total the works of Krupp, of Essen, figure for 110,000 tons.

Upon the whole there was rather a quicker demand for iron in the Haute Marne in July than in June, but during the last few days orders appear to have once more become more active and better sustained, as re-assortments are being secured for warehouses. A quotation of 8*l.* 8s. per ton for rolled iron from coke-made pig has become general, and has been accepted without discussion as the basis price. There has been a fair current of orders for sheets and iron wire; this last article is worth 12*l.* 16s. per ton for No. 18. In the Nord iron is quoted very generally at 8*l.* per ton, but for small lots for re-assortment 8*l.* 4s. per ton would be given. Although the pre-

sent may be the dead season there has been a tolerably satisfactory current of orders. Plates have made 10*l.* 8s. to 10*l.* 16s. per ton, according to the importance of lots.

Gold Mining in New Zealand.—We have to report a very great improvement in the prospects of the field during the month, as the increased prices of stock quoted in the share reports will testify, as well as the names of claims fresh to the list of quotations. The greatest incentive to the improved tone of the market and increased demand for mining stock is to be found in the important discovery at the deep levels. The opening up of a nice golden leader at the 360 ft. level of the Kuranui Hill United Mine has had an influence not only upon the stock of that company but upon all the surrounding mines in that important group, situate in the vicinity of the Caledonian and Golden Crown old rich runs of gold. Before pumping operations were recommenced a little lode was traced in the 360 feet level, Kuranui workings, and the manager felt great hope of it. His efforts were, consequently, directed towards its development when the water was once more drained, and it is gratifying to be able to report the fulfilment of his most sanguine expectation. The little leader has junctioned with a reef coming in stronger and showing gold, and the expectations of those shareholders who anticipate that it may lead to a rich find are not at all unreasonable. In the interest of the field as well as the shareholders of this fine property we trust they will not be disappointed. The development of such a lode would encourage the Tookey (now the Success) and other companies to prosecute further prospecting works, which would be likely to lead to a return of that golden prosperity which marked the earlier history of the field.
— *Thames Advertiser*, June 19.

Meetings of Public Companies.

CARDIFF AND SWANSEA SMOKELESS COAL COMPANY.

The ordinary general meeting of shareholders was held at the City Terminus Hotel, Cannon-street, on Friday, July 30.

Mr. P. P. Mosley in the chair.

Mr. John Davies (the secretary) read the notice convening the meeting, and also the minutes of the last meeting, which were confirmed. The report and accounts were taken as read.

The Chairman said he must preface his remarks by calling the attention of the shareholders to the fact that, contrary to the hope and expectation of many well-informed business men, the coal trade of the country had remained, certainly as regarded prices, in the same unimproved condition in which it was when he had the pleasure of addressing the shareholders a year ago. This in itself would account for the result which was shown on the year's working; but although this was in some measure disappointing, it must be borne in mind that their actual loss in reality only amounted to somewhere the amount of the debenture interest, the financial position of the company in regard to the year's working being practically the same as it was last year. He was also anxious that they should understand that, notwithstanding a stagnant state of trade and low prices, they had had in addition to contend against the strikes of July and August of last year—slight compensation for which had, however, been made by the Monmouthshire and South Wales Colliery Association, as they would see notified in the balance-sheet—together with intermittent working consequent on differences as to wages and other matters. From all these causes combined their output had been reduced by about 60,000 tons from that of previous years. Everyone conversant with colliery matters must be well aware how materially a heavy decrease in the output like this must unfavourably affect the working expenses; and it was no small matter of congratulation to the board and the officials of this company that, notwithstanding all these drawbacks, they were able to show a result not worse than that of last year. Since that result had been ascertained he had informed himself as to what some other coal companies and private colliery owners had done during the past year, and he was pleased to find that the accounts of this company compared very favourably with the results which many others had shown. Prices had ruled about the same as last year, and their agents at Cardiff had done as well for the company as anyone could expect. He was at Pentre Colliery on the previous Monday, and on his visit there he found everything in good and efficient order, and the colliery working regularly. As regarded Resolven he was sorry to have to remark on the unfortunate state into which the levels had fallen—a circumstance which it was quite impossible for him to forsee. Although coal worked, as they had been working it there, towards the crop of the seam often resulted in its gradually depreciating in quality and hardness, and renders it unremunerative to work on account of the extra cost from the seams thinning out, and allowances having in consequence to be made to the colliers. The state of these levels had for many months past engaged the serious attention of the board and the manager. It would have been a great mistake to have discontinued working them until it was thoroughly proved that the deterioration was more than of a local character; and they had, therefore, to make this point as certain as possible, even although it involved an increased cost, before they were justified in taking any decided step. Having thus touched upon the gloomy side of the Resolven picture, he had now great pleasure in informing them that the sinking and opening out of the Cwm pits left nothing to be desired so far as they could at present judge. He was down in this pit on the previous Monday morning, and he could not speak too favourably of what he then saw. The coal was hard in comparison to that of the No. 1 seam, and resembled in character that of the Aberdare district. It burned remarkably well and clean, and the roof was 40 ft. of rock of the hardest description. The sinking of the second pit there was being prosecuted with every vigour, as was also the opening out underground; and he hoped they might soon be in a position to send out a good quantity of coal from these pits of a quality superior to any yet raised at Resolven. He now came to the resolutions (sent into the board) of Mr. Moxham, but the directors thought on general grounds that it would be very undesirable to interfere with the Articles of Association, and they also thought that three directors would be insufficient to carry on the business of the company. For these reasons they could not accept the resolutions, and they held sufficient proxies to negative their being passed as a special resolution; but in their place, in so far as there was a reduction of expenditure, the board sometime ago themselves determined on reducing so far as lay in their power the current expenses of the company during these bad times. (Hear, hear.) They agreed that should the result of last year's working come out no better than that of the preceding one they would for the present, and until a real revival of prices set in, conduct the business of this company for half the remuneration which was apportioned to the original board by the Articles of Association. When those Articles were framed no doubt the original directors were consulted on these points, and as they were men practically versed in colliery matters, and, therefore, well aware of the amount of work which the conduct of the business of such a company as this would entail, their opinion was that 1350*l.* per annum was only an adequate remuneration for their services. Experience showed that in this view they were no doubt correct, for the amount of work and responsibility which fell on the board of such a company as this was very great, and entailed constant care and attention. Still the board being always anxious to do their utmost in every way for the shareholders determined at no small personal sacrifice to do at all events their little best—little as of necessity that could but be—towards the reducing the expenses of the company—although no similar reduction has been proposed or even asked for elsewhere—and they had agreed to propose to the shareholders that they should for the present, and until times improve, accept one-half of their remuneration—550*l.*, instead of 1350*l.*—for conducting the affairs of this great company, with a capital of over half a million. Col. Shakespear had given notice of a motion asking the present board to resign; but had since withdrawn it, as the directors were at present engaged in endeavouring to carry out a resolution seconded by himself at the last meeting. With regard to the resolution passed at the last meeting, and recapitulated in the report, he had only to state that the very gravest consideration had been given by the board to the matter which the shareholders by that resolution ordered them to take the best means in their power to carry out. After a most searching investigation by the company's solicitor, proceedings had been taken against the vendors. Those proceedings were still pending, and under these circumstances it would readily be understood that it was in the interests of the shareholders that their nature and extent should not be made public in the present state of affairs. He might, however, say this much, that the opinion of counsel, on which those proceedings had been taken, was very strong and decided, and the board were fully determined that no effort should be wanting on their part to obtain as far as possible for the shareholders that relief which they sought. The Chairman then moved the adoption of the report and accounts.

Mr. Henry White seconded the motion.

Mr. Appleton could not agree with the Chairman that the accounts of this company contrasted favourably with those of other companies.

The Chairman remarked that he said "some other companies."

Mr. Bland said a good many of the collieries had closed altogether.

Mr. Appleton continued that the company contrasted unfavourably with the Newport Abercarn Company. He then said that in seven years the amount of coal raised was 1,378,792 tons, the amount received for which was 808,149*l.* In one year there was a profit of 40,934*l.*; but taking the whole period the loss was upwards of 20,000*l.* In reference to the proceedings against the vendors, Mr. Appleton at some length dissented from the resolution embodied in the report. He said they were all aware of the circumstances connected with the formation of the company, which took place at a time when such properties were at a considerable premium; but he thought the vendors had gone as far as men of business could be expected to go; and that they had acted in a most liberal spirit towards the company.

Mr. Dundas said that although Mr. Appleton began his remarks with a good deal of captious criticism on the accounts, the whole speech was a sort of *nisi prius* case on behalf of the vendors. The directors were well fortified by their legal advisers, and it was only right that the shareholders having a year ago adopted this resolution, should allow the board to do what they thought best for the company. The colliery did not pay because it was taken over at too high a figure. He had the fullest confidence in the directors, and trusted they would be encouraged to go on doing their best for the company.

Mr. Wilson also remarked on the unsatisfactory state of the accounts, and attributed the misfortunes of the company in a great measure to the fact that too large a price was paid for the colliery. The directors were bound to enforce their claim against the vendors if they could legally do so.

After some remarks by Messrs. Moxham and Crooke, the Chairman, in reply to the observations made, said he hoped the company would hereafter produce dividends. They were cutting down expenses in every direction. Two eminent mining engineers had carefully inspected the collieries and examined the accounts, and they had fully endorsed the present management of the company.

Mr. Lewis Williams said it was quite an exception for any colliery to show such a favourable result as had been achieved at Pentre during the past year. (Hear, hear.) They had got hold of a very good thing, and with a slight rise in the market they would have very good results. He believed that there would be a rise in coal and iron, and that with better times they would have good times hereafter.

The Chairman remarked that the Newport Abercarn Company was getting the benefit of its neighbours' misfortunes, and it was not at all fair to compare the company with Cardiff and Swansea. With regard to the raising of money to avoid calls, it was necessary last year to get 10,000*l.* to sink the shaft, and the directors asked the vendors to allow them to raise 10,000*l.* to be a first charge before their debentures; but the request was not complied with, and there was no alternative but to call up 10s. a share from the shareholders.

Mr. Cory: You ought to say what the vendors offered to do.

The Chairman added that the vendors offered to subscribe a portion of the debentures, or to allow the new debentures to rank *pari passu* with those held by themselves; but the directors felt that they could not raise the money on the security offered. Major Vaughan Lee had very kindly foregone his royalties amounting to 5644*l.*, which about cleared off the loss on the year's operations.

The report and accounts were then adopted unanimously.

The retiring directors, Messrs. W. Boden and H. White, were re-elected, and the auditors, Messrs. Cooper Brothers and Co., were re appointed.

A long conversation then ensued with respect to the proceedings which are being taken against the vendors, in the course of which Mr. Appleton entered his protest against the pending action.

On the motion of Mr. Cory, seconded by Mr. Wake, a vote of thanks was passed to the Chairman and directors, and the meeting then terminated.

UNITED VAN CONSOLS AND GLYN MINING COMPANY.

The ordinary general meeting of shareholders was held at the mines on July 28,—Mr. J. C. Bolton in the chair.

The report was taken as read.

The Chairman stated that the meeting was held at the mines because it was thought fair to the shareholders of the Principality, and then explained the items in the accounts. He had formed the opinion that they had got possession of a valuable property, and he was confident that before long they would have satisfactory returns. They had been sinking a winze 11 or 12 fms. under the 50, and the indications were encouraging. They were now sinking Murray's shaft to a similar depth. The shaft would be down to the 60 by the end of August, when a level would be driven west, and the 50 and 60 communicated. He might mention that when they had got down to the 60 they were still 77 fms. above the deepest workings in the Van Mine This was no mere guess work. It had been carefully worked out by Mr. Thomas and Capt. Roach, so that they were able to state quite positively—and they had the very greatest pleasure in saying it—that they had got seven more levels to work in order to be at the same depth as that now worked so advantageously at the Van. Their wealth was discovered in depth, but independently of that they had seen some very good ore taken out of the 50. As they went lower they would discover greater wealth, for there was no doubt the mine was to be developed by depth, and sinking would be one of the chief causes of their prosperity. After reading and commenting upon extracts from the reports of Capts. Ball and Williams, he remarked that the Van and themselves were working after the same north lode, and the discovery made by the one must affect the prosperity of the other. It really became a race between them which should find the north lode first. That it would be found eventually he had not the least doubt. As they went down in depth they would develope far greater riches. He was quite sure about this. He had a strong opinion upon it, because he had considered the matter careful, and he had opportunities of forming his judgment, though he had not worked in the depth of the mine like some of the practical men amongst them. He wished them particularly to bear in mind that they had at present only reached the depth of 60 fms. from the adit level, or 105 from surface, and in the course of a short time they would develope other levels and increase considerably their wealth and the value of the property.

Mr. W. Thomas seconded the motion for the adoption of the report and accounts.

Mr. E. Davies (Mayor of Llanidloes) said that before the motion was put he wished to ask if the liquidation was closed yet. He happened to meet a gentleman who had an account against the old company, and who told him that the liquidation had not been closed, and that proceedings were likely to be taken. If there was anything of this kind it would be very much better that all matters should be disclosed at once, otherwise the shareholders would be uneasy as to the future prospects of the company.

Mr. Henry Francis asked why the creditors of the old company were not paid? As he understood from the agreement and the resolution when the two companies were made into one the creditors were to be paid in full.

The Chairman said that with regard to Mr. Francis's question it has reference to the creditors of the Van Consols. We have nothing to do with the Van Consols property in the first instance. His claim is against the liquidators of the Van Consols, until all assets shall have come into the liquidators' hands, and the Van Consols liquidation shall have been closed. I may say that the liquidation proceedings are coming rapidly to a close, as the only suits that were pending have been settled by a payment by the defendants to the liquidators of a sum of 900*l.* What the ultimate result will be I cannot tell, because the final accounts have not been closed, but there is nothing more to do with regard to the Van Consols liquidation than to tax the costs and settle the liquidation charges.

Mr. Price Jones was, upon Mr. R. Smith's proposition, seconded by Mr. Talbot, elected a director in place of Mr. Adam Murray, who retired by rotation, and did not seek re election; and in acknowledging the appointment said that if he could by looking after his own interest, and also theirs—for their interests were identical—promote the prosperity of the mine, and if there was no opposition he was willing to sacrifice some amount of time, which to him was valuable, in assisting in that undertaking which he had always believed in from the commencement as being a great mine, and as promising to be one of the greatest mines in Montgomeryshire. Although he had not hitherto had a seat at the board, he might say that really he had been a director of the mine, as very little had taken place in any of its ramifications but what he had known. In his opinion there were no secrets at the board meetings in London. He could assure them that he would use his humble efforts to assist the directors and the shareholders to develope the mine, and to make it not only equal to the Van—they did not want to out rival it—but to prove it to be one of the best mines in Montgomeryshire.

Upon the proposition of Mr. Bignell, seconded by Mr. E. R. Morris, Mr. J. J. Stansfield was re-appointed auditor, and 10*l.* 10s. was voted for past years services.

Thanks were then voted to Mr. Cooper, the secretary, Captain Roach, Mr. J. J. Winser, the solicitor, and to the Chairman and directors, and the meeting then separated.

Green Hurth.—A meeting of shareholders was held on Tuesday at the offices, Westgate-street, Newcastle-on-Tyne, to elect the directors, &c. Mr. J. Cameron Swan was in the chair. All the old directors were re-elected, and it was decided that their remuneration should remain as previously until the next meeting, when the question will be more prominently brought forward. The Chairman stated that he had gone thoroughly through the mine on Monday, and inspected every part. From what the men who were employed stated Mr. Vipond was using his usual precautions, and not misleading in his reports in any way. The quantities were probably 7, 7, 5, and 5 tons per fathom in the respective workings, with every prospect of an increase rather than a diminution. All extraordinary expenses were finished, and the new shaft, with engine, &c., which had cost the company equal to 6s. per share, would be in a position to be used in a very few weeks.

[For remainder of Meetings, see to-day's Journal.]

Retrogressive Invention.—It is reported that an American inventor proposes to apply dynamo-electricity to the working of a stone-breaker, with which he makes from 1000 to 2000 blows per minute, the actual breaking being effected with a wedge-shaped hammer. As to the actual crushing arrangement it may possess certain advantages, but to use the power at second-hand instead of direct is retrogressive. Ten-horse power indicated at the steam-engine will give scarcely six-horse power after passing through a dynamo machine—that is to say, the alleged improvement would reduce the work done at a given cost to just over one-half.

Rolling Mills.—An improvement in the coupling device applicable to rolls of the same elevation, by which one roll is made to drive another, has been invented by Messrs. Glover, Reynolds, and Taylor, of St. Louis, Missouri. This has been done by forming the rolls with one end projecting beyond the journal boxes and forming longitudinal recesses in this end, which receive inwardly projecting ribs upon the coupling box, so as to cause the coupling box to turn and to communicate rotation to a spindle extending from one roll to another, said spindle being grooved like the ends of the rolls for the engagement of the coupling box, which laps on to both the spindle and roll ends. It has been impracticable to keep the rolls in exact line, or even a near approximation thereto, so that the coupling is required to be made very loose to prevent binding and straining of the parts. The consequence is that there is a great amount of jarring and wear from the loose motion between the parts, which are necessarily made very heavy. The improvement consists in supporting the coupling spindle on a spring centre spindle at each end, said centre spindle being socketed in the coupling spindle, and its end entering a centre hole in the end of the roll. This construction prevents the ends of the coupling spindle beating against the ends of the rolls, and acts as a support to said spindle. The position of the centre spindle may be reversed; it may be socketed in the roll and its centre enter a centre hole in the coupling spindle. The centre spindle may be applied without a spring, but would not operate as well.

TECHNICAL EDUCATION IN JAPAN.

The introduction of Western learning into the Japanese Empire dates from the period of Hoyei (1703-11), and the honour of having done so much for the advancement of the country belongs to Arai Kimiyoshi, who instituted enquiries into the condition of Rome and Holland, and to Iyenobu, the seventh Shogun of the Tokugawa family. After that Katsuragawa Hochiku, the medical officer of the Shogun, Aoki Bunzo, and Nishikawa Joken studied with a Dutch scholar the Dutch language, medical science, and astromony, and their noble example being quickly followed by others the subjects were gradually made known to the people. It was from this small beginning that the Tokio Daigaku, or University of Tokio, and the various other prosperous establishments connected with Mombusho have sprung. But although Honzaku-Kioku, or the translation office in connection with the observatory at Asakusa was established in 1811, many Japanese being therein employed to translate Dutch books, and changed in 1856 to Bansho-shirabejo, or office for examining foreign books, which in the following year was opened for instruction, the retainers of the Tokugawa family being first admitted, and soon after the retainers of all the provincial princes also (the course embracing English, French, German, and Russian languages, mathematics, botany, and chemistry), the real foundation of the present system may be dated from the appointment, in 1866, of Mr. Gratama, of Holland, as teacher of chemistry, this being the first time that a foreign instructor was employed in the institution. In the following year the system of instruction was changed, so as to teach mainly in the English language. The institution was abolished in the first year of Meiji (1868), when the Bakufu (Tokugawa Government) resorted its sovereign authority to his Imperial Majesty the Tenno.

In January of the second year of Meiji the institution, re-established, was opened, and the English and French languages were chiefly taught, German being subsequently added. The object in view being always the same Yogakujo, Kagakujo, enlarged to Rigakujo (the department of science) were incorporated with the Daigaku Nanko, which and the Daijokuan, or central government, directed each Han, or provincial government, to select intelligent pupils, aged from 16 to 20, to be educated in the institution—one, two, or three of these Koshin-sei, according as the income of the Han was, 10,000 koku, 50,000 koku, or 150,000 koku of rice. The origin of Japanese national exhibitions, it may here be mentioned, was the small exhibition first opened to the public in Bussau Yen (the botanical garden), Kudanzakaure, under the authority of this institution, in May of the fourth year of Meiji. The number of alterations made, such as substituting the Mombusho for the Daigaku Nauko, which was made a subordinate establishment, the abolishing of the Koshin-sei, were well calculated to cause the absence of students which actually followed, and the adoption when Mombusho formed the educational districts of the inconveniently long name Dai-ichi-Daigakuku-Dai-ichiban-Chingaku (the first middle school of the first grand educational district) was sufficient to prevent the institution acquiring any prominent individuality. The difficulty was, however, to some extent remedied in the following year by changing its name to Kaisei-Gakko, and it was at once determined to arrange courses of study in law, chemistry, engineering, polytechnics, and mining—it was determined that the first three of these should be taught in English, polytechnics in French, and mining in German.

The appointment of Mr. Kato Hiroyuki as Sori (president) on Feb. 1 of the tenth year of Meiji (1877) marks the real establishment of the University in the form of similar institutions in Europe and America. A month afterwards Mombusho united Tokio Kaiseigaku with Tokio Igakko (the Medical School) to form Tokio Daigaku (the University), Eigogaku (the English language school) being made Yobimon (the preparatory school), and excellent arrangements were made for the teaching. In December, 1878, Mombusho vested in the University of Tokio the power of granting degress, and those of Hogakushi, Rigakushi, Igakushi, and Bungakushi are given in the departments of law, science, medicine, and literature respectively. To judge from the examination papers set, and the large proportion of the questions that must be satisfactorily answered to secure a pass (whilst failure involves formal degradation or dismissal) every precaution appears to be taken to secure so high a standard for the degree that it shall be everywhere respected; hence it is not surprising that the students which Mombusho has sent to England, America, France, &c., have all acquitted themselves well, and obtained good positions in the colleges they have attended, thus securing credit for themselves, and reflecting honour on Tokio Daigaku, which has had the responsibility of training them. No more need be hoped than that the University will long maintain its present prestige and prosperity.

RUBY AND DUNDERBERG CONSOLIDATED MINING COMPANY.

Special Report on the Dunderberg Mine by the Superintendent, dated Eureka, July 15:—I was through the Dunderberg Mine yesterday, and the following are a few remarks concerning it. The 300 west drift is being drifted in very favourable looking ground. In the present end there is a well-defined fissure, on which there is ledge matter and small pieces of ore occasionally; this drift is being pushed out under the Home Ticket ground, and as it is well situated for prospecting purposes, will be carried on until the quartzite is reached. The 400 south is being driven with all possible speed towards the southern end line. The rock in the present end is somewhat harder than it has been, consequently slower progress is being made. The fissure is well-defined and regular, but no signs of ore yet. The 500 north is in very favourable ground—in fact, there is ore in more or less quantities all the distance drifted, and in the present end they are constantly meeting with bunches of ore, and of good quality. I am expecting to strike ore in quantities in this drift shortly. This drift is parallel with the main 500 drift, and consequently in new ground.

Stopes.—In the stope above the 300 a drift is being made in a mass of sediment, in which occasional stones of good ore are found; this body of sediment is the largest we have yet encountered, and judging from other ore bodies found in the mine we may reasonably expect to find a large ore body in this ground shortly, and this work being within the lines of the Home Ticket ground we can carry on the prospecting work deemed advisable. In the stope below the 400, near the turntable, the ore is small. A drift is at present being made from the winze connecting the 400 and 500 leads to come underneath this ore so as to be able to follow it at less cost. The two stopes above the 500 are looking very well. I call them two stopes, but virtually it is one and the same ore body. In the northern end of this ore body the ore is about 4 ft. wide, of good quality; in the centre there is a large mass of low grade ore, from which the last shipments were made, but in raising in this low grade ore we find it to improve in quality as we go up; at present there is a face of ore, 8 ft. wide, of fair quality. In the bottom of the 500 level, immediately under the stope last named, there is a body of fine ore making down; no work has been done on it below this level as yet. The 500 north drift, when continued far enough, will be connected with the 500 main drift, and as soon as this is completed a winze will be sunk in the bottom of the 500 to explore this ore; it cannot be done conveniently before this connection is made. Taking the mine altogether the prospects are very good.

Ruby and Dunderberg Consolidated.—Report for the week ending July 11: The north drift from the east cross-cut on the 500 ft. level has advanced 24 ft.; now in 70 ft.; the size varies from 2 ft. to almost nothing; appearances are favourable. The stopes commenced at the back of this drift last week continue about the same. The ore in the stope above and east of the 500 ft. level has materially improved, especially in quality; this is the place where most of the low grade ore we have lately shipped has been taken from, though when we first began it we got out the lots, which assayed over $100. The ore body under the turntable in the 400 ft. level is somewhat smaller, still going down south and east of the winze, and a drift has been commenced about 30 ft. down in the winze to intersect it. The 400 ft. south drift is now being run under a new contract by other parties at $4 per ft., and the men have advanced 10 ft.—rock very hard. The west cross-cut on the 300 ft. level has advanced 6 ft.—now in 41 ft.; there are occasional small bunches of ore. A drift has been commenced during the week from the rise above the 300 ft. level, and has been continued 30 ft. through broken ground, with occasional bunches of ore. There is no doubt that the ore will be encountered again shortly, the kind of ground we are passing through being very favourable. During the week we have been doing considerable timbering, which accounts for our shipping only 80 tons of ore. We have 31 men at work, besides four contractors and about six tribute workers.

— Copy of telegram received from Eureka on Aug. 3: The first-class ore melted during the week was 82 tons, and realised net about $30½ per ton; second-class ore melted, 72 tons, and realised about $11 perton. We have made a new discovery in the 5th level; the ore so discovered we know to extend 25 ft. in length—width unknown. The mine generally has improved. I have remitted by telegraph 2000*l.*

Lectures on Practical Mining in Germany.

CLAUSTHAL MINING SCHOOL NOTES*—No. CLVIII.

BY J. CLARK JEFFERSON, A.R.S.M., WH. SC.,
Mining Engineer, Wakefield.
(Formerly Student at the Royal Bergakademie, Clausthal.)
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The rule we have given for finding the velocity and quantity of air passed through a mine is only true under the supposition that the composition of the air remains the same in the upcast as in the downcast shaft, and that the air meets with no resistance in passing through the mine. We will now consider the influence that these two causes have upon the velocity and consequently the amount of ventilation.

The composition of the return air current influences the amount of ventilation, inasmuch as its density may be altered irrespective of temperature by admixture with other gases. In all mines the air takes up a large amount of moisture, which makes it lighter than an equal volume of dry air at the same temperature and pressure. The return air current of mines may generally be considered as being saturated with moisture. We may, therefore, have the following problem to solve. What is the weight of a cubic foot of air either fully or partly saturated at a given temperature and for a given barometric pressure? To determine the above we must find the tension of the aqueous vapour for the given temperature. This is generally to be obtained from tables of the tension of steam for temperatures below 100° Cent. The tension can also be found by means of an emperical formula given by Tredgold. If the air is not saturated with moisture the above tension must be multiplied by the number expressing the degree of saturation to obtain the actual tension of the moisture present.* We must now subtract the tension of the moist air of the returns, as given by a manometer or barometer, to obtain the tension due to air alone. Thus far we shall have obtained the relative tensions of the moisture and the dry air in any given volume of moist air. Since the relative volumes of dry air and of aqueous vapour in a cubic foot of moist air are in direct ratio to the tensions, we can thus obtain the amount of dry air and of aqueous vapour in a cubic foot of moist air.

The weights of the dry air and the aqueous vapour having been obtained, if added together give us the weight of one cubic foot of moist air for the given barometric pressure and temperature.

Should other gases be present their amounts must be ascertained, and the density of the dry mixture estimated (after the amount of moisture has been ascertained as above) by taking into account the difference in density of the gas and air.

The weight of the air column of the upcast shaft is then found by multiplying its cubical contents by the weight of a cubic foot of moist air, as above obtained.

The weight of the downcast column of air can be ascertained in the same way, though except for very exact calculations the intake air current may be considered as containing no aqueous vapour. From the difference in weight of the upcast and downcast air columns, the theoretical velocity can then be calculated as shown in Lecture 158.

FRICTION.—The velocity calculated, as shown in Lecture 158, and which we have for the sake of distinction called the theoretical velocity is that which the air would have supposing it to meet with no resistances. A very large proportion (over 90 per cent.) of the motive power (motive column) is required to overcome the friction against the surfaces of the air ways and shafts, and in passing round corners and through openings of varying section.

The following are the laws relating to the friction of air in passing through a shaft or level:—

1.—The friction varies in direct proportion to the area of rubbing surface, and is, therefore, in direct proportion to the length and to the perimeter of the air way. From this rule it follows that the power required to overcome the friction varies directly in the proportion of the length and perimeter of the air way. Hence the same power which would pass a given quantity of air through a passage 1000 yards long would pass the same quantity through each of two air ways of the same section as the first 500 yards long; and it follows that if the area and depth of the shafts are great compared with the area and length of the airways, to that we can neglect the resistances in them; the dividing of the air current into two splits, each half the length of the single one, will introduce double the quantity of air into the mine. The influence of the length of the perimeter for a given section, and consequently with a given velocity, also for a given quantity of air, is equally important. Let us suppose the case of an air way 4 ft. by 6 ft., the perimeter is 18 ft., and the sectional area 20 ft. square. Suppose a second air way 8 ft. by 10 ft., the perimeter is 36 ft., and the sectional area 80 square feet. In the latter the rubbing surface, and consequently the friction, is only twice as great as in the former, whilst it passes four times as much ventilation. To make up the same section as the latter would require four air ways of the same sectiou as the former, and they would offer twice as much rubbing surface as the former, and would consequently require twice the power to pass the same quantity of air through them. This shows the great advantage of having the air ways of large size; and generally if the sectional areas of the air roads in a mine are doubled, so as to pass twice the same amount of air, the increase of power required is only about 40 per cent. Not only can a great advantage be obtained by making the area of the air ways of a mine as large as possible, but the form of the section of the air way gives in some cases a less perimeter for the same area than in others. The circular form is that whose perimeter is least for a given area. The square form is that amongst rectangular sections whose perimeter is least for a given area. The circumference of circle whose area is 1 is about 3·55, whilst the perimeter of a square whose area is 1 is 4, and the perimeter of a rectangle whose area is 1, and the length of the sides in the proportion of 4 to 5 (a very common section in mines) is 4·03. From this it will be seen that it is of advantage to keep the section nearly square or circular, and where it is most convenient to have the height and breadth of different dimensions the elliptical is the best form; and generally that by so doing a saving of 10 per cent. in the ventilating power required may thus be effected.

According to experiments by Peclot to determine the actual velocity, he found that in the cases where the air ways are short compared with the length of the shafts, and that the latter are lined with brick. The actual velocity is found by multiplying what we have called the theoretical velocity by 2·6 times the square root of the quotient of the mean diameter of the air course, divided by the length plus four times the mean diameter of the air course. When, on the other hand, the length of the shafts is short compared with the length of the air ways, the actual velocity is found by multiplying what we have called the theoretical velocity by twice the square root of the quotient of the mean diameter of the air ways divided by the length.

2.—The friction varies as the square of the velocity of the air currents. Consequently to pass double the amount of air through an air way in the same time four times the power is required. From this rule it is evident how great is the advantage obtained by splitting the air; for by so doing, to get a given quantity of air through the workings, a much less velocity is required, and the economy in power is not simply in the proportion of the reduced velocity, but as the difference of the squares of the reduced and original velocities. Suppose, for example, that the air passing along an air course were split, so that one-half the amount passed through each of two splits, equal in section to the former. There is the same total amount of air passing, but at half the velocity, and consequently with one-fourth the friction, or with an expenditure of one-fourth the power. This suppoees that the length of each split is equal to the length of the single air way; so that if the lengths of these are reduced the amount of ventilation which can be got through them will be still further increased. Or supposing the unital power (drag on the water guage) to remain the same, and the length of each split to be equal to the length of the original air way, double the amount of air can be got through; whilst if the length of each split be less than the length of the original air way the amount of air which can be got through is more than doubled. If each split be half the length of the original air way then the total amount of increase is in the proportion of 1 to 2·82. If, for example, the length of the original air way was 2500 yards, and the current was divided into two splits, each 1600 yards long, the amount of air passed through the workings is increased in the proportion of 1 to 2·5. Suppose again that the air is split into three currents, and that the total quantity remains the same; then the velocity is reduced one-third, and the friction is one-ninth. If the splits are of the same length and section as the original air way, and supposing the section of the shaft greater than that of all the splits, and its resistance small compared to that of the air ways, the same height of motive column will pass three times the quantity of air through the mine. If in addition to this the length of each split is reduced to 900 yards the quantity of air passed through the mine is not only trebbled but increased fivefold. The reason of this greater increase on account of the reduction of the length of the splits follows from both the first and second law of friction. For by diminishing the length of each split the friction is reduced in the proportion of the reduction of length of the split, but as in practice the initial power (drag of water gauge) remains the same, the velocity of the current increases until with the shorter length the friction is the same as with the greater length and the lesser velocity. The reduction of friction in the case of an air way 2500 yards long and a split 1600 yards long is as 2500 to 1600; hence, to obtain the same frictional resistance in the latter case, the velocity must be increased, so that the friction due to the increased velocity is to friction due to the original velocity as 2500, 1600. But as the friction is in proportion to the square of the velocity, the square of the increased and original velocities must be in the proportion of 2500 to 1600, and the velocities themelves in the proportion of the square roots of 2500 and 1600, or as 50 to 40, or as 5 to 4. The increased quantity of air is in direct proportion to the increased velocity, or each split passes one and a quarter (five-fourths) the quantity of air, or for the two splits two and a half times the quantity of air with the same motive height or drag on the water gauge.

We should here point out to prevent confusion that in the last mentioned example we have used the expression "the same motive height or drag on the water gauge," but that this does not mean with the same actual expenditure of power; on the contrary, to pass double the amount of air with the same water gauge requires double the power. In the case of natural ventilation for a given temperature in the mine and at the surface the height of the motive column is the only determinate quantity in the actual available power. If the area of the air ways is equal to that of the shaft we shall have the maximum available power. If the area of the air ways is less the actual available power is proportionately less. Hence, by increasing the total area of the air ways to that of the shaft we can increase the actual ventilating power at our disposal.

The actual ventilating power is absorbed in two ways—1. By overcoming the resistances, frictional and otherwise; and, 2. In giving velocity to the air currents, on which depends the amount of ventilation. Any saving of power by reduction of the resistances is an equal gain for that portion of the power which is exercised in giving velocity to the air currents, and consequently for increasing the amount of ventilation. In the case of uatural ventilation the actual ventilating power is generally a fixed quantity, according to the temperature of the surface and underground; whilst the actual amount of ventilation is more under the control of the manager, as by a judicious arrangement in splitting the air current a much larger amount of air can be passed through the workings than with a bad arrangement. Summing up the laws of friction of air in mines, we have the following general rule:—The proportion of the height of the motive column required to overcome the friction is equal to the perometer of airway, × length of airway × by the square of the velocity ÷ by area of airway, and × by a constant. The value of this constant is given by some writers, but as it is different for the brickwork lining of shafts and levels, and for coal, and depends on the smoothness and straightness of the road, and is given for the case of a single airway, the above rule is of no practical value for calculating the power required for ventilating a mine, and is useful chiefly as showing the relative influence of the shortening and splitting of airways. Although the air naturally splits itself through all the openings whirh are presented to it, the systematic introduction of the splitting the air current in order to obtain the advantages from it pointed out by the above laws was first introduced into the mines of the North of England by Mr. Buddle.

* The degree of saturation is obtained by means of a hygroscope, as already described.

MANUFACTURE OF IRON AND STEEL.

Some descriptions of cast-iron, and amongst them some Swedish and other varieties of exceptional purity as regards phosphorus and other hurtful foreign substances, are, as is well known, deficient in silicon, and therefore unsuitable for treatment by the ordinary Bessemer process, as the requisite temperature cannot be obtained. In order to be enabled to deal satisfactorily with such irons and obtain high-class steel from them by the pneumatic process of conversion, Mr. G. E. DERING, of Lockleys Welwyn, proposes to line the converter in which they are to be treated with a basic or with a carbonaceous lining, and work under excess of pressure by checking the egress of the issuing gases from the convertor by any suitable means, or he injects powdered or vaporous fuel with the blast, or he makes use of both these methods conjoined, the use of purifying reagents being superadded in combination with either or both of them if desirable. He similarly employs excess of pressure in the convertor, which may in this case have a siliceous or basic or carbonaceous lining, or injection of powdered or vaporous fuel with the blast, or both methods conjoined, in order to obtain a sufficient elevation of temperature for the successful blowing of metal that has been previously dephosphorised by any treatment which has likewise had the effect of depriving the iron of all or part of its silicon, as for example, those methods consisting in treating the molten metal at a comparatively low temperature by metallic oxides.

In reducing iron ore or puddling iron in a rotary furnace, the semi fluid or partially molten mass is apt to slide along the lining instead of being rolled over on itself, so as to expose continually fresh surfaces, and undergo suitable agitation. To remedy this defect, and at the same time to provide protection for the throat of the furnace which is most exposed to the destructive action of the heat, and to ensure the division of the puddled mass into balls of convenient size for handling, Mr. C. W. SIEMENS, of Westminster, proposes to provide at the back of the rotating vessel an annular casing surrounding the throat, and from this casing he leads two or more pipes along and within the refractory lining of the vessel to a trunnion joint at the centre of the front of the vessel. In this trunnion joint he provides a facing like that of a rotating slide valve with ports communicating with those pipes, and also with a supply and discharge pipe connected to the trunnion, the former from a water cistern, pump, or accumulator, and the latter leading to a drain or other outlet. As the vessel revolves water flows by the trunnion ports along some of the pipes to the annular casing at the throat of the furnace, and back thence to the discharge, a circulation of water being thus secured, keeping the pipes themselves and the furnace throat comparatively cool. Owing to the coolness of the pipes extending along the interior of the rotating vessel, a portion of the molten material solidifies on them, encrusting them so as to form inwardly projecting longitudinal ribs, which, as the vessel rotates cause the pasty mass to roll and tumble over on itself, thereby facilitating and promoting the reducing and puddling action. In order to subdivide the mass into portions, so as to form balls of convenient size, he makes the pipes that extend along the interior surface of the furnace chamber with several bends or expansions projecting inwards. The material encrusting these bends or expansions forms mounds projecting from the general surface of the lining, which as the chamber rotates have the effect of dividing the more or less viscid mass into separate lengths, each of which by the rolling becomes formed into a ball. The working door of the furnace occupies a place in its front out of the centre, clear of the trunnion, and also of the branch pipes radiating from it to the longitudinal pipes. For charging the vessel it is turned to such a position that the door is above the centre, and the charge may be shot into the vessel from an elevated platform. When the balling is effected, the rotating vessel is stopped in such a position that the door is under the centre; the door is then opened, and the balls are withdrawn. The balls may either be shingled and treated in the usual way to produce malleable iron, or they may be introduced into a bath of molten pig, according to a known process for the production of steel.

It is well known that steel, whether produced in this manner or by the Bessemer or other similar process, is apt to be more or less spongy in its structure, and means have been devised for remedying the defect and obtaining sound, dense, and homogeneous steel castings, such as by subjecting them to steam pressure, compressing the metal in the mould with a plunger, and so on. Mr. Siemens somewhat varies the arrangement. Providing, in the first place, a very strong mould somewhat higher than is required for the charge of metal, so as to leave a little space in the mould above the metal, and providing a cap or cover which can be strongly and quickly fixed by an elastic fastening, such as a steel key, on the top of the mould after the metal is run into it, he connects this cap or the upper part of the mould with an accumulator in which water is kept by pumping under considerable pressure, such as several hundred pounds on the square inch. After charging the mould with the fluid metal he quickly secures the cover on the mould, and then, by opening a cock or valve, he admits the water under pressure into the space in the mould above the metal. At first the water, being caused by the heat of the metal to assume more or less the spheroidal condition, does not rapidly become converted into steam, but as steam is generated from it the elastic fastening yields, allowing gradual escape, so that the pressure in the mould is maintained within safe limits while the whole of the metal in the mould is subjected to pressure. In the meantime a second mould may be filled with metal, and this in its turn may have its contents subjected to pressure as above described, and so with mould after mould in succession; and obviously the mode of compression above described is applicable to steel, however produced, whether it be poured into the mould from a crucible or from a converter, or directly, or by a ladle, from any steel producing or melting furnace. One connecting pipe from the accumulator may serve for several moulds, being made flexible or jointed to allow for its being shifted; also it may have in the union by which it is connected to the mould a valve which is opened by the act of connecting the union, and is closed by the act of disconnecting it, and the orifice in the mould or cover may be provided with a check valve.

According to the invention of Mr. J. H. WILSON, of Liverpool, a fine tool steel is produced by melting together—wrought scrap-iron, 46 lbs.; spiegeleisen, 2 lbs.; ferro-manganese, ¼ lb.; and charcoal 6 ozs. The resulting fine tool steel may be improved in quality and rendered more homogeneous by the addition of ½ oz. of borax and ½ oz. of chlorate of potash, which are added during the conversion. The same effect can be obtained by substituting for the chlorate of potash an equal portion of the nitrates, or nitrates of the alkalis, or alkaline earths, or of similar chlorates, chlorites, or perchlorites, iodates, iodites, or periodates, bromates, bromites, or perbromites. The wrought-iron, or wrought-iron scrap which he prefers to use, is iron such as horse shoes, nails, factory cuttings, and like wrought-iron scrap, or scrap rails, or bars, or like scrap. This iron, as before stated, he melts in a suitable converter or crucible with certain proportions of spiegeleisen, ferro-manganese, and charcoal, to which a small portion of borax and a small portion of chlorate of potash or its chemical equivalent may be added. He would have it understood that it is not essential that the borax and chlorate of potash or its chemical equivalent be added; for example, for turnery tool steel he melts in a suitable pot, crucible, or converter—48 lbs. of wrought scrap iron, 1½ lbs. of spiegeleisen, ¼ lb. of ferro-manganese, 11 ozs. of charcoal. The resulting steel is run into a mould or ingot, and may be hammered out in the usual way. The quality of the steel is dependent upon the quality of the wrought-iron used for conversion into steel. The proportions are varied according to the hardness or mildness of the steel required.

To convert wrought-iron or scrap wrought-iron, which alone are used, into crucible steel, Mr. J. H. WILSON, of Liverpool, proposes to melt or reduce the wrought-iron or wrought-iron scrap in any suitable converter or crucible with any of the usual fluxes and carbonaceous matter, as now applied in the manufacture of crucible steel; and he then adds nitrate of soda, or nitrate of potash, or chlorate of soda, or chlorate of potash, or any of their chemical equivalents, to such wrought-iron when in a molten state, the result being that the molten wrought-iron is converted into steel of the highest quality. The proportions of the nitrate of soda, or nitrate of potash, or chlorate of soda, or chlorate of potash, or their chemical equivalents, will slightly vary according to the nature of the steel required to be produced. He sometimes adds a small quantity of borax, which acts with the flux. Nitrate of soda, and nitrate of potash, and chlorate of soda, and chlorate of potash, have been used in the production of steel prior to his invention, but such applications have been limited to molten purified or converted pig or cast steel. His invention is distinguishable from such former manufacture by his use of wrought-iron, or scrap iron only, for conversion into steel, and he is thereby enabled to produce by one process steel of the highest quality and class ready for immediate use.

ELECTRIC MOTOR.—The object of the invention of Mr. H. CHAMEROY, of Paris, is to utilise in a special manner the magnetic action acquired by an electro-magnet, or of a bobbin having an electric current passed through it, to displace by its attraction a rod or bar placed inside it or in its neighbourhood or field, and to transform this alternate to and fro movement into a continuous rotary motion; an electric motor is thus obtained. In order that the displacement of the rod or bar shall be sufficiently pronounced, instead of only one rod being placed in the interior of the solenoid several armatures are arranged in it. These armatures have articulated joints arranged in zig-zag order, which allows them to extend or develope and successively approach each other, this movement causing the alternate motion of the motor rod. A multiplication of the displacement of the armatures is thus obtained, this being the distinctive feature of this electric motor. According to one method the plates are joined to each other by bronze hinges, the maximum of the separation of the armatures being limited by screws with their heads free to move in sunken holes of convenient shape. The plates have a rod passing through their centres from which they are insulated by suitable washers which allow a certain play. If an electric current is passed through the bobbin all the armatures being under the influence of the current are magnetised, and instantly tend to approach or attract each other; but as the top plate is fixed to the upper disc of the bobbin it attracts to it the next armature, which in its turn attracts the next, and so on. The upper armature causes the centre rod to descend by pressing on its upper shoulder. The displacement imparted to this rod is equal in amount to the distances separating the armature plates. As the armatures only come in contact at their ends there is no reason to fear the effects of the residual magnetism. The movement of the centre rod is converted into a rotary motion by attaching it to a connecting rod in connection with a crank or crank shaft. The motor may be also advantageously arranged by constructing it with two bobbins, two rods, two connecting rods, one shaft having two cranks, and a fly-wheel with a view of obtaining a constant motion. The electric current is distributed alternately to one and to the other of the two bobbins by means of a distributer or commutator fixed to a shaft.

HOLLOWAY'S OINTMENT AND PILLS—BOWEL COMPLAINTS AND DIARRHŒA.—When these diseases prevail immediate recourse should be had to this ointment, which should be rubbed two or three times over the abdomen, and the internal irritation would gradually subside. All inflammation will be subdued, and excessive action restrained. This treatment, assisted by judicious doses of Holloway's pills, is applicable in all forms of diarrhœa and dysentery attended by heart sickness, griping, flatulency, and other distressing and dangerous symptoms. After rubbing in the ointment a flannel binder should be worn, and the patient should be restricted to a farinaceous diet for a few days, till the urgency of the disease has been diminished by the persevering employment of the remedies.

PARIS EXHIBITION, 1878.

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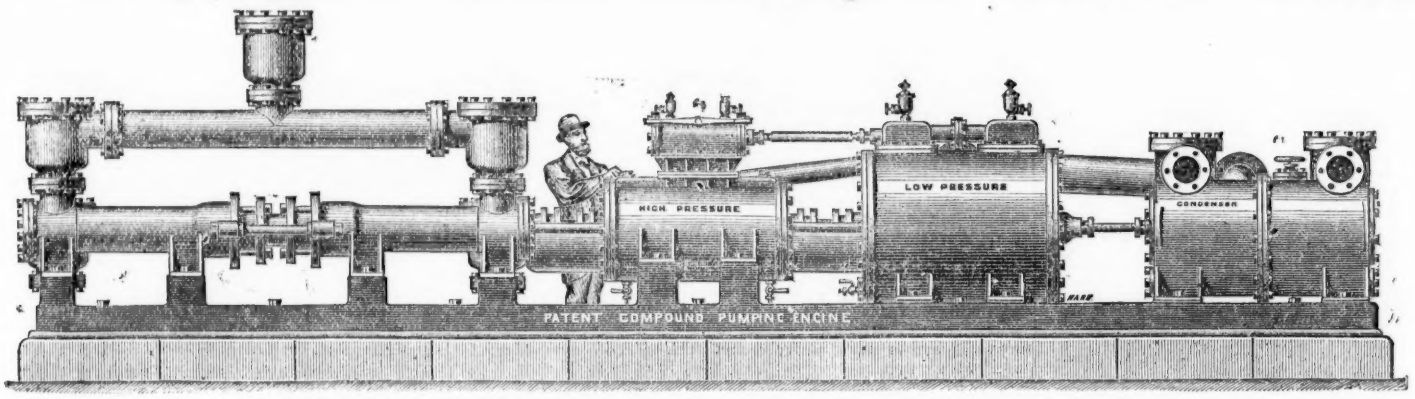

TANGYE'S DIRECT-ACTING COMPOUND PUMPING ENGINE, WITH AIR-PUMP CONDENSER.

TANGYE'S COMPOUND PUMPING ENGINE COMBINES SIMPLICITY, CERTAINTY OF ACTION, GREAT ECONOMY IN WORKING, COMPACTNESS, AND MODERATE FIRST COST.

This Engine will be found the most simple and economical appliance for Mine Draining, Town Water Supply, and General Purposes of Pumping ever introduced, and as regards Mine Draining, the first cost is very moderate compared with the method of raising water from great depths by a series of 40 or 50 fm. lifts. No costly engine-houses or massive foundations, no repetition of plunger lifts, ponderous connecting rods, or complication of pitwork, are required, while they allow a clear shaft for hauling purposes. In this Engine the economical advantages resulting from the expansion and condensation of steam are very simply and effectively obtained. The steam after leaving the high-pressure cylinder is received into and expanded in the low-pressure cylinder, and is thus used twice over before being exhausted into the condenser or atmosphere.

The following first-class Testimonials will bear evidence as to the efficiency and economy of the Engine:—

TESTIMONIALS OF TANGYE'S COMPOUND PUMPING ENGINE.

$\frac{21'}{36}$ × 10" × 48" COMPOUND CONDENSING STEAM PUMPING ENGINE.

Newcastle and Gateshead Water Company, Newcastle-on-Tyne, Oct. 20, 1879.

Messrs. Tangye Brothers.

GENTLEMEN,—In reply to your enquiry as to the efficiency of the two pairs of Compound Condensing Engines recently erected by you for this company at our Gateshead Pumping Station, I have great pleasure in informing you that they have far surpassed my expectations, being capable of pumping 50 per cent. more water than the quantity contracted for; and by a series of experiments I find they work as economically as any other engine of the compound type, and will compare favourably with any other class of pumping engine. By the simplicity of their arrangement and superior workmanship they require very little attendance and repairs, and the pumps are quite noiseless. A short time ago I had them tried upon air by suddenly shutting off the column, and found they did not run away, thus showing the perfect controlling or governing power of the Floyd's Improved Steam-moved Reversing Vale. I will thank you to forward the other two pairs you have in hand for our Benwell Pumping Station.

Yours respectfully,
(Signed) JOHN R. FORSTER, Engineer.

$\frac{21''}{36}$ × 12" × 48" DOUBLE RAM COMPOUND CONDENSING STEAM PUMPING ENGINES.

The Chesterfield and Boythorpe Colliery Company (Limited), Registered Office, Boythorpe, near Chesterfield, Oct. 1, 1879.

Messrs. Tangye Brothers. Supplied in January, 1878.

GENTLEMEN,—Referring to the above, which we have now had working continuously night and day for the last 12 months, we are glad to say that it is giving us every satisfaction. It is fixed about 400 feet below the surface, the steam being taken down to it at pressure of 45 lbs. per square inch. We can work the pump without any difficulty at 28 strokes per minute=224 ft. piston speed. The pumping power is enormous. The vacuum in the condenser being from 11½ to 13 lbs. The pump is easily started, and works well and regularly. The amount of steam taken being much less than we anticipated. We consider the economy in working very satisfactory indeed. The desire for power and economy at the present day will certainly bring this pump into great requisition.

Yours truly,
(Signed) M. STRAW, Manager.

SIZES AND PARTICULARS.

Diameter of High-pressure Cylinder	In.	8	8	8	10	10	10	10	12	12	12	12	14	14	14	14
Ditto of Low-pressure Cylinder	In.	14	14	14	18	18	18	18	21	21	21	21	24	24	24	24
Ditto of Water Cylinder	In.	4	5	6	5	6	7	8	6	7	8	10	7	8	10	12
Length of stroke	In.	24	24	24	24	24	24	24	24	24	24	24	36	36	36	36
Gallons per hour approximate		3900	6100	8800	6100	8800	12,000	15,650	8,800	12,000	15,650	24,450	12,000	15,650	24,450	35,225
Height in feet water can be raised with 40 lbs. pressure per square inch in cylinder	Non-condensing	360	330	160	360	250	184	140	360	264	202	130	360	275	175	122
Ditto ditto	ditto—with Holman's Condenser	480	307	213	480	333	245	187	480	352	269	173	480	367	234	162
Ditto ditto	ditto—with Air-pump Condenser	600	384	267	600	417	306	335	600	440	337	216	600	459	203	203

CONTINUED.

Diameter of High-pressure Cylinder	In.	16	16	16	16	18	18	18	18	21	21	21	24	24	24	30	30
Ditto of Low-pressure Cylinder	In.	28	28	28	28	32	32	32	32	36	36	36	42	42	42	52	52
Ditto of Water Cylinder	In.	8	10	12	14	8	10	12	14	10	12	14	10	12	14	12	14
Length of stroke	In.	36	36	36	36	48	48	48	48	48	48	48	48	48	48	48	48
Gallons per hour approximate		15,650	24,450	35,225	47,950	13,650	24,450	35,225	47,950	24,450	35,225	47,950	24,450	35,225	47,050	35,225	47,950
Height in feet water can be raised with 40 lbs. pressure per square inch in cylinder	Non-condensing	360	230	160	118	456	292	202	149	397	276	202	518	360	264	562	
Ditto ditto	ditto—with Holman's Condenser	480	307	213	154	603	389	269	198	528	363	269	691	480	352	750	
Ditto ditto	ditto—with Air-pump Condenser	600	384	267	191	750	486	337	248	660	450	337	864	600	440	937	

PRICES GIVEN ON RECEIPT OF REQUIREMENTS.

Any number of these Engines can be placed side by side, to work in conjunction or separately as desired, thereby multiplying the work of one Pump to any extent.

NORTHERN DEPOT:—TANGYE BROTHERS, St. NICHOLAS BUILDINGS, NEWCASTLE-ON-TYNE.

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(PRIZE MEDAL, INTERNATIONAL EXHIBITION.)

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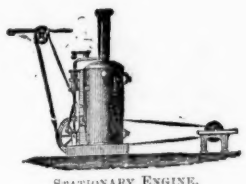
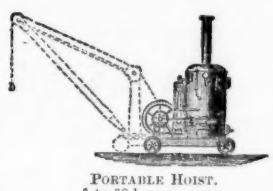
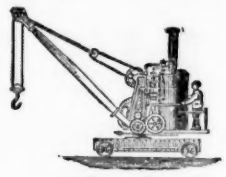


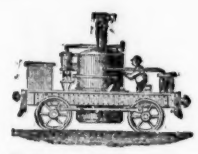
STATIONARY ENGINE.
From 1 to 30 horse-power.
No building required.



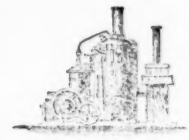
PORTABLE HOIST.
1 to 30 horse-power.
With or without Jib.



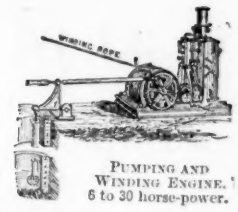
STEAM CRANE.*
15 cwts. to 20 tons.
For Wharf or Rail.



CONTRACTORS' LOCOMOTIVE.
9 to 27 horse-power.
For Steep Inclines and Quick Curves.



SHIPS' ENGINE.
For Winding, Cooking, and Distilling.
Sanctioned by H.M. Government.



PUMPING AND WINDING ENGINE.
6 to 30 horse-power.

* These cranes were selected by H.M. Commissioners to receive and send away the heavy machinery in the International Exhibitions 1862, 1871, and 1872.

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Steam and Hand Derrick and Overhead Travelling Cranes.

Engines and Boilers for Light Screw and Paddle Steamers.
Steam Cargo Barges, Steam Launches, and Yachts.

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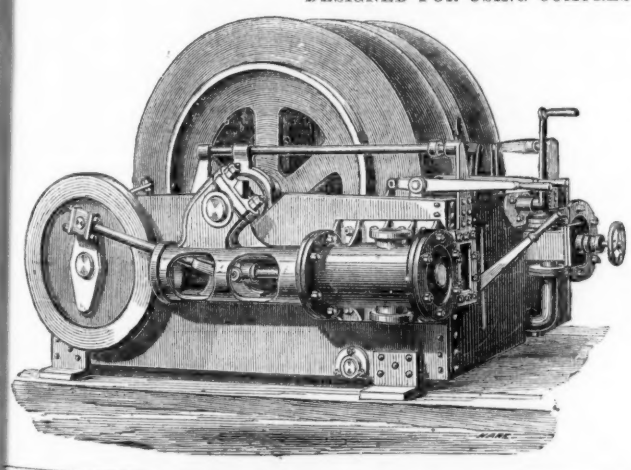
DESIGNED FOR USING COMPRESSED AIR OR STEAM.



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No. 1 size, 7 in. single cylinder, with 2 ft. drums.
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A,— 6 in. double cylinder, with 2 ft. 3 in drums.
B,— 8 in. " " 3 ft. 0 in drums.
C,—10 in. " " 3 ft. 6 in drums.
D,—12 in. " " 4 ft. 6 in drums.
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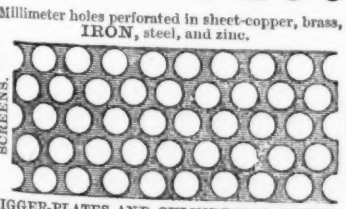

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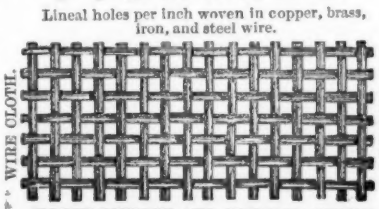

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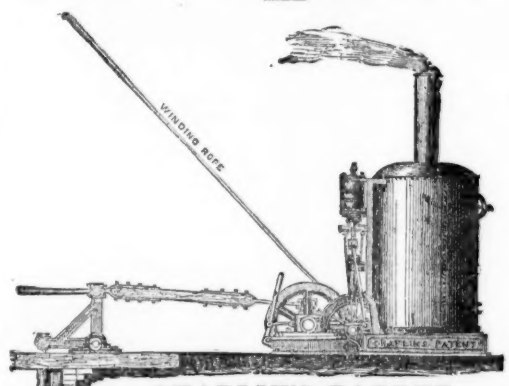

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FOR PUMPING AND WINDING.

SPECIALLY ADAPTED for PITS, QUARRIES, &c. SIMPLE and STRONG; require NO FOUNDATION or CHIMNEY STALK, and are EASILY ERECTED or REMOVED.
Sizes, from 2 to 30-horse power.

Steam Cranes, 1½ to 30 tons, for railways, wharves, &c.; hoist, lower, and turn round in either direction by steam.
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Ships' Engines, for winding, cooking, and distilling, passed by H.M. Government for half water.
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FOR MY LATEST PATENTED STONE BREAKERS AND ORE CRUSHERS.

Stones broken equal, and Ores better, than by hand, at one-tenth the cost.

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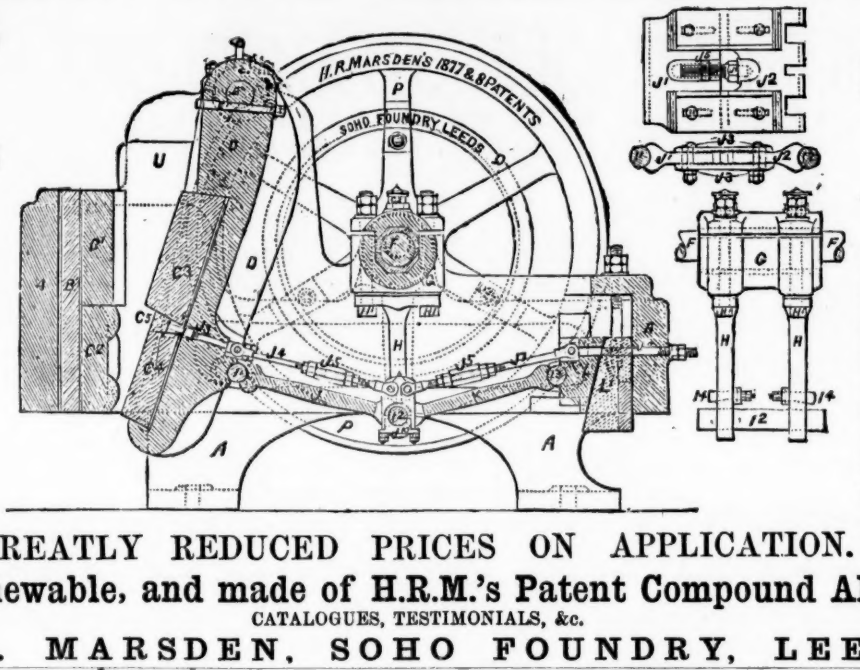

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Dear Sir,—We have adopted your Stone Breakers at many of the mines under our management, and are pleased to be able to state that they have in all cases given the greatest satisfaction.

We are, yours faithfully,
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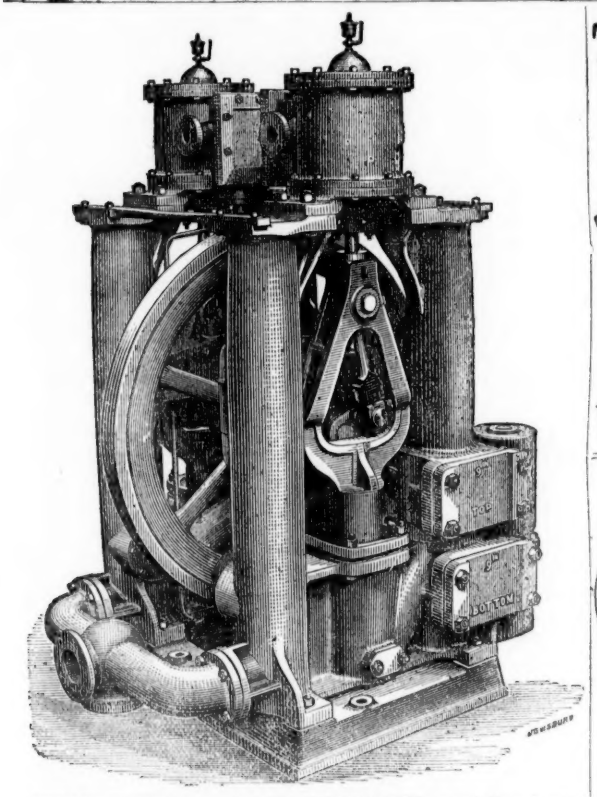

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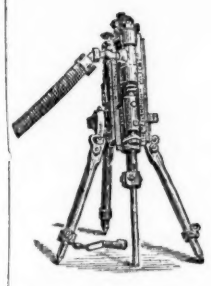

Air-Compressing Machinery,

Simple, strong, and giving most excellent results, and

ELECTRIC BLASTING APPARATUS.

Full particulars of rapid and economical work effected by this machinery, on application.

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WELDED STEEL CHAINS { FOR CRANES, INCLINES, MINES, &c., MADE ALL SIZES.

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